EVALUATION OF THE EFFECTIVENESS OF THE

"ADULTS NEED DAIRY TOO" PROGRAM

By

SHONDA MARIE SPECK

Bachelor of Arts/Science in Nutritional Sciences

New Mexico State University

Las Cruces, NM

2008

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
May, 2011

EVALUATION OF THE EFFECTIVENESS OF THE

"ADULTS NEED DAIRY TOO" PROGRAM

Thesis Approved:

Dr. Barbara Brown

Thesis Adviser

Dr. Deana Hildebrand

Dr. Josh Phelps

Dr. Mark E. Payton

Dean of the Graduate College

ACKNOWLEDGMENTS

I would like to start by thanking Dr. Barbara Brown for serving as my advisor. I have really enjoyed developing this Adults Need Dairy Too program with you. Thank you for your all time in making the program and my thesis happen. Your guidance and support is greatly appreciated. I would also like to thank Dr. Deana Hildebrand and Dr. Joshua Phelps for serving as my thesis committee. Thank you for responding to any emails and questions I have had in a timely manner and thank you fitting me into your busy schedules. In addition, I would like to send a big thank you to Dr. Hermann. You were very helpful with my data analysis. You did a great job explaining all the results and making me feel better for not getting the results I was hoping for. I greatly appreciate your time.

I would like to thank all the Nutrition Education Assistants who were willing to participate in the new program and complete the 24 hour recalls. Without their help I would not have been able to complete my research.

I would like to thank my parents and family. I have such a wonderful and supportive family. You all have always made feel like I can be great. Your encouragement has always made me strive to make you proud. I am truly blessed.

I would like to thank my sister and best friend, Shanae. You have always brought joy to my life. The fact that you look up to me makes me want to try to always do my best. Thank you for being you!I would like to thank my amazing boyfriend, Jacob. Your strength and optimism inspire me every day. You have been so great, keeping me sane though my Master's degree. Having you in my life makes this achievement even better.

Lastly, I want to thank my nutrition girls. Thank you for help with homework, the long study dates, and the fun times in between. I would not have made it through the last 2 years without you!

TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

CHAPTER I

INTRODUCTION

According to the Dietary Guidelines for Americans 2005, dairy products provide seven essential nutrients: calcium, potassium, magnesium, protein, phosphorus, vitamin D and vitamin A [1]. Many adults in the United States do not consume recommended levels of four of these nutrients (calcium, potassium, phosphorus, and vitamin D) in their daily diets [1]. Dairy products provide approximately 70% of calcium in the typical American diet and are the most commonly consumed sources for potassium, phosphorus and vitamin D in the nation [2]. Dairy products also help to reduce risk for certain health complications. According to a study done by Heaney, et al. [3], one of the most significant factors for decreasing the risk of osteoporotic fracture is high calcium consumption, specifically dairy food consumption throughout life. Furthermore, potassium is one of the most important nutrients associated with lowering blood pressure, and one 8 ounce glass of milk supplies 11% of the daily value per serving [2]. Lastly, dairy products have been shown to help with weight loss in obese patients who incorporated three to four servings a day in their daily diet [4].

These benefits are commonly known in the dietetic and nutrition community, but not as known by the general public [5], specifically the low-income population [6]. Much of the dairy consumed is full fat. In fact, only 23% of limited resource adults were reported to use low fat or nonfat dairy products. Regardless, both high- and low-income adults believe that it is important to a eat healthy diet [6].

Obesity is a growing problem in the United States and especially in Oklahoma. In 2008 Oklahoma had the fourth highest rate of obesity in the United States at 31.4% [7]. Even though dairy consumption is low overall in the United States [8], consumption of high-calorie dairy products such as cheese has increased [9]. High-calorie products, like cheese, could be a key contributor to Oklahoma's high obesity rates. In order to relay the information on the contribution of dairy products to the diet, a tri-state project was implemented in Oklahoma, Texas, and New Mexico to increase dairy consumption in limited resource adult populations. This project was funded by the Southwest Dairy Farmers Association. This study focused on educating a group of limited resource adults in Oklahoma enrolled in the Community Nutrition Education Program (CNEP). Around 70% of low-income adults in the United States are consuming less than two servings of dairy daily [6]. There are several possible reasons this low consumption may occur. Dairy products tend to spoil faster than other types of foods. Those with a low-income might have an issue with making dairy last through the month if they are not able to buy dairy more than once per month. A large number of people from this population are from groups more susceptible to lactose intolerance which leads to reduced dairy consumption [10]. A lack of grocery stores and transportation might pose a problem for limited resource adults as well.

Child nutrition problems have become a national focus over the past couple of decades [11]. Unfortunately, adults are less likely than children to have adequate intake of calcium, magnesium, and vitamin A, but are not receiving the same attention nutritionally as children [6]. Dairy products are a good source of all three of these nutrients[1]. Many adults are not aware of the benefits associated with dairy products. With this lack of knowledge, it is apparent that adults need nutrition education focused on increasing dairy intake. A program was developed to address this issue. The "Adult Need Dairy Too" curriculum was developed to provide education on the health benefits of dairy consumption. This program specifically focused on low fat and nonfat dairy products and incorporating them into the adult diet. The program provided information on

ways to incorporate dairy daily on a low-income budget. Meal ideas and means of preparation were provided. Additionally, food safety in regard to preparing, storing, and proper cleaning of dairy foods was highlighted.

The "Adults Need Dairy Too" (ANDT) curriculum was developed as a supplemental education component to the existing CNEP (Community Nutrition Education Programs) curriculum. CNEP participants are limited resource families or individuals eligible to receive food assistance or commodities [12].

Problem Statement

Inadequate dairy consumption in the limited resource adult population due to economic, cultural, health, and preference barriers indicates a need to educate CNEP participants on the following: importance of dairy consumption, economical ways to incorporate dairy in a daily diet, food safety instruction, and food preparation suggestions that include dairy foods.

Purpose

The **purpose** of this study is to measure the impact of ANDT program on increasing low fat dairy intake in a limited resource adult population enrolled in CNEP in Oklahoma.

Objectives

The **objective** of this study is to develop and evaluate the effectiveness of educational materials used to teach adult CNEP participants how to increase dairy intake. The rationale for this study is that once the post-tests have been collected and analyzed, there will be a better idea of where this population stands in their dairy knowledge/consumption. This data is a starting point for further dairy education and we will be able to see which methods work for this population.

Specific Aim 1: Develop and implement educational materials providing dairy information and tips for preparing dairy foods for a limited resource adult population. These lessons should help promote dairy intake by increasing knowledge and improving attitude towards dairy products.

Specific Aim 2: Evaluate the effectiveness of the curriculum with this population through 24-dietary food recalls to gain direction for future research and education. Results will indicate directions for future educational programs to possibly reach more people more efficiently.

Hypothesis

Ho1: There will be no significant difference in the frequency of the CNEP participants' consumption of one milk equivalent servings after the completion of the ANDT curriculum.

Ho2: There will be no significant difference between the frequencies of the CNEP, ANDT curriculum participants' and the non-ANDT curriculum participants' consumption of one milk equivalent servings.

Assumptions

24-hour food recall results will reflect knowledge learned through the ANDT program. Every participant will attend all lessons for both the current CNEP curriculum and for the ANDT program. Participants will be willing to learn and practice what they learn. There will be no differences in the way lessons are taught by the Nutrition Education Assistants. Participants will complete 24-hour food recall truthfully and accurately. Lastly, we assume there was enough time between the teaching of the lessons and the post test to allow for behavior changes to occur.

Limitations

One limitation is a possibility of variations between the way the dairy lessons are taught due to multiple Nutrition Educations Assistants (NEAs) and different participants in each class. There is also possible variation in the way the NEAs collect the pre- and post- 24-hour food recalls. Entries might not be specific enough to count milk-equivalents accurately. Timing of the food recall collection could also play a role in the results. In addition, the participant groups were a convenience sample selected by the Oklahoma Cooperative Extension Service (OCES) CNEP program leaders. People with a low income may not be able to buy as much food towards the end of the month therefore leading to a decreased intake of several different foods, including dairy products. Some participants may live in areas where low fat and nonfat dairy products are difficult to obtain. Also, budgets of some participants may limit their purchases of low fat and nonfat dairy foods. Lastly, lactose intolerance or other health issues may prohibit increased dairy consumption by some participants.

Definitions

1. DASH diet- "Dietary Approaches to Stopping Hypertension." An eating plan that provides nutrients associated with lowering blood pressure and limits nutrients that raise blood pressure.
2. Metabolic Syndrome- a group of metabolic risk factors which include: abdominal obesity, proinflammatory state, prothrombotic state, atherogenic duslipidemia, elevated blood pressure, and insulin resistance.
3. EFNEP-"The Expanded Food and Nutrition Education Program." Federally funded program designed to assist the low-income population with nutrition knowledge and skills in order to make healthy food choices for themselves and their families.
4. CNEP- "Community Nutrition Education Programs." Under the umbrella program, EFNEP, these programs are provided by Oklahoma Cooperative Extension Services. CNEP also includes ONE programs. The programs use evidence-based information to increase nutrition and physical activity knowledge in low-income adults and children in order to better the health of Oklahoma residents and to help decrease disease prevalence.
5. ANDT program-"Adults Need Dairy Too" program. This program is a supplemental learning segment added to the existing CNEP curriculum aimed at increasing nonfat, low fat dairy consumption in the adult population.
6. SNAP -"Supplemental Nutrition Assistance Program" formally known as FSNE- "Food Stamp Nutrition Education." A federally funded program which provides nutrition education to food stamp recipients. This program is provided to help individuals choose healthful foods within a limited budget.

7. ONE Program-“Oklahoma Nutrition Education” Program. This is the SNAP education program in Oklahoma. This covers recipients of SNAP benefits or those who qualify for SNAP benefits.
8. BMI- Body mass index- measurement of weight status and is calculated by weight in kilograms divided by height in meters squared.
9. WHR- Waist to hip ratio- measurement of the circumference of the waist divided by the circumference of the hip. This number is an indicator of health risk due to fat distribution.

CHAPTER II

REVIEW OF LITERATURE

This review will cover the essential nutrients associated with dairy foods along with the diseases these foods and nutrients help prevent. It will also cover the current consumption rates of dairy foods in the United States and Oklahoma while highlighting the barriers to adequate dairy consumption in different populations. Grocery shopping for dairy foods and issues that arise with transport and availability will be discussed.

Health Benefits of Dairy Product Consumption

The health care system has shifted to a focus on disease prevention [13]. With this new mind set, the nutrient content of the foods Americans are consuming has become a priority. Dairy products provide seven essential nutrients which include calcium, potassium, magnesium, protein, phosphorus, vitamin D and vitamin A [1]. Table 1 shows the percent nutrient contribution of dairy foods in the US food supply as of 2000 [2]. Several studies have shown better health outcomes for those who consume more dairy than those who do not [14]. Compared to other food choices, dairy products are one of the most nutrient dense and beneficial foods relative to their cost [15]

Table 1. Percent Nutrient Contribution of Dairy Foods, Excluding Butter, to the U.S. Food Supply, 2000

Nutrient	%
Energy	18.1
Protein	19.4
Total Fat	11.8
Carbohydrate	4.5
Vitamins & Minerals	
Vitamin B_{12}	20.3
Vitamin A	11.4
Calcium	72.2
Phosphorus	32.7
Magnesium	15.8
Potassium	18.1

The most significant and bioavailable source of calcium is found in dairy products [16]. Approximately 72% of calcium found in the American diet comes from milk, yogurt, and cheese [15]. In research conducted by Fulgoni, et al [15], adults who consumed three or more servings of dairy daily surpassed the recommended adequate intake for calcium intake. Research suggests calcium is needed in high amounts throughout life in order to achieve optimal bone mass and reduce bone loss as one ages [17]. Calcium also plays an important role in nerve conduction, muscle contraction, cell adhesiveness, mitosis, and blood coagulation[18].

In addition to calcium, dairy products are also a good source of protein, specifically whey protein which plays an important role in muscle and bone growth and maintenance. In a study involving resistance training, dairy proteins including whey, showed a faster recovery in skeletal muscle after exercise [19]. These high-quality proteins also have preventative features and they have been shown to protect against sarcopenia and, in combination with calcium [3], osteoporosis [20].

Potassium, another nutrient abundantly found in dairy foods, is necessary because it plays a vital role in energy metabolism, fluid balance, proper cell functioning, and membrane transport, all important functions of the body [21]. Inadequate intake of potassium can lead to disorders in heart, nerve and muscle function. Potassium can be found in many foods such as fruits, vegetables, dairy products, nuts, whole grains, and beans [21]. However, dairy foods are considered a good source of potassium and have been shown to be the main source of potassium in the American diet [22, 23]. According to the FDA, a food item must contain 10-19% of the daily value for a particular nutrient in order to claim the food item to be a "good source" [24]. The daily recommended intake of potassium is 4700mg [25]. An eight ounce serving of yogurt contains 11% of the daily value of potassium, quantifying an eight ounce serving of yogurt as a "good source" of potassium. Also, an eight ounce serving of fluid milk contains around 8% of the daily recommended amount of potassium [21]. Potassium intake has also been reported to be lower than recommended levels in the American diet. In a review of 2008 data NHANES, McGill, et al. [21] found that adults are only consuming about 2563mg of potassium, which is only a little over half of the daily recommendation.

An added benefit to being health smart, other than one's own health, is the influence that an individual may have on their family. The dietary habits of parents strongly influence the dietary habits of their children [9]. Since children are in a crucial growing and health phase of their lives, it is important for parents to set a good example for them [9]. Given that calcium is the most critical nutrient needed for bone health during this growing phase [3], calcium rich foods are necessary for optimal growth. Dairy foods are the best foods for calcium intake and many other beneficial nutrients [15]. For this reason, parents should monitor their own dietary intake to positively influence their children in order for them to grow and develop properly. This includes adequate dairy intake [9].

Calcium Bioavailability

Dairy products are the most concentrated source of calcium and provide 70% of the calcium in the US food supply [16]. In a study by Martini et al. [17], dairy products tended to have a more successful effect on decreasing the parathyroid hormone. Parathyroid hormone levels are used as an indicator for calcium status because they decrease as serum calcium levels increase [17]. A diet supplemented with milk showed a more significant decrease in the parathyroid hormone compared to a diet supplemented with orange juice and calcium citrate supplement, each providing 500mg of calcium. As for bone resorption, all three calcium supplements did not have different effects on bone resorption on the subjects in the same study [17].

Nonfat and low fat milk and some yogurts have also been named the best source of calcium because they contain high amounts of vitamin D and potassium which aid in the absorption of calcium. Through fortification, dairy products are one of the few food sources of vitamin D. Other vitamin D food sources include fatty fish and fortified cereals. Although fortification is not a requirement, the majority of the milk in the America food supply contains vitamin D [16].

Calcium sources also affect the bioavailability of other nutrients. Dairy products appear to be more affective in aiding with absorption of nutrients such as potassium and magnesium. Calcium is also present in some vegetables. However, vegetables contain phytates and oxalates that decrease calcium absorption in the intestine [26]. When compared to meals supplemented with equal amounts of calcium in the form of orange juice or a calcium carbonate supplement, a meal that included milk produced a significantly higher serum level of phosphorus [17]. Overall, dairy foods provide an advantage over calcium supplementation because they contain several nutrients which in turn allows for nutrient interactions and better absorption [16].

Factors that can affect calcium absorption are intestinal resistance to vitamin D, low levels of estrogen with postmenopausal women and hypochlorhydria [17]. Hypochlorhydria is a condition of low hydrochloric acid production in the stomach which in turn decreases calcium absorption [27]. Being that dairy foods are the most available source of calcium [15], individuals with these conditions must make dairy consumption a higher priority than others.

Dairy for Disease Prevention

Oklahoma residents have a high prevalence of some chronic diseases, including obesity and diabetes, compared to the rest of the nation [28]. In 2009, Oklahoma was ranked 47th in the nation with 31.4% of adults being obese [7]. In 2005, 1 in 10 Oklahomans had diabetes and ranked the 4th highest diabetes mortality [28]. Several studies have shown dairy products to protect against several different common diseases such as osteoporosis, hypertension, heart disease, metabolic syndrome, and diabetes [4, 16].

Calcium deficiency is a major contributor to osteoporosis, a decrease in bone mass which can lead to fracture [3]. Since dairy products are a main source of calcium [15], the two topics are often studied together. Osteoporosis is a disease that is of concern throughout a person's life. If peak bone mass is not achieved by the completion of bone mineral content development around the age of 20, osteoporotic effects start occurring later in life [15]. Individuals with osteoporosis have decreased bone mass and bone tissue that can increase fragility of bones which can lead to bone fracture. Osteoporosis has been described as a "pediatric disease with geriatric consequences" [29]. Fifty-five percent of people 55 years and older suffer from fractures related to osteoporosis [20], but peak bone mass is normally achieved around age 20 [30]. For this reason, bone mass must be maintained throughout life, in order to prevent osteoporosis. Calcium is a key constituent of bone mass. Without adequate amounts of calcium, bones are missing one of their main components, which in turn may cause weak and fragile bones that can lead to osteoporosis [3].

Another advantageous characteristic of dairy products is the preventive role they play against hypertension and cardiovascular disease in the circulatory system. A review by McCarron[31] showed that dietary intake of calcium, magnesium, and potassium has a protective factor against high blood pressure in adults. The potassium found in dairy has been associated with a decreased risk of cardiovascular disease and stroke due to a lowering of blood pressure [21]. Potassium is necessary to regulate sodium which in turn balances fluid levels. If there is too much sodium in the body, net renal sodium absorption increases which in turn increases water absorption to maintain constant plasma sodium concentrations. This results in an increased volume load that raises blood pressure [32]. Calcium also plays a part in maintaining healthy blood pressure levels through a shared role with other ions such as sodium, potassium, and magnesium in which an ionic balance is maintained within the vascular membrane [33].

The Dietary Approaches to Stopping Hypertension (DASH) diet is used for hypertensive patients and is designed to help lower blood pressure [34]. This diet incorporates 2-3 servings of dairy along with 8-10 servings of fruits and vegetables, whole grains, fish, poultry and nuts for an 8 weeks period. Those who have been compliant with the DASH diet have significantly lowered their blood pressures [34]. The DASH diet is usually more successful in individuals who have moderately high blood pressure [34]. As promoted by the DASH diet, the combination of low fat and nonfat dairy products along with fruits and vegetables, whole grains, and lean proteins have the most positive effect for lowering blood pressure [8].

Metabolic syndrome is a group of risk factors that increase the chance of the development of coronary heart disease, diabetes, and stroke. Dairy consumption has shown to have a negative relationship with metabolic syndrome. In a study by Yoo et al. [35], dietary intake of dairy foods by young adults were recorded in order to find patterns related to metabolic syndrome. Those who had risk factors for metabolic syndrome had a lower intake of dairy compared to those who

had did not have metabolic syndrome. Age, sex, ethnicity, BMI, and physical activity were adjusted for in this study to eliminate skewed results [35].

Heart disease has also been closely related to dairy food consumption. The consumption of whole milk was positively related to heart disease in one study [36]. Another study showed support through a meta-analysis. Four different studies in the meta-analysis indicated an overall decrease of 10-15% in risks associated with the occurrence of heart disease in people who drank more low fat milk [14]. The prevalence of stroke is associated with dairy food consumption as well. A meta-analysis of seven studies related to stroke and milk consumption showed a 20% decrease in the stroke happenings in people who drank the most of any type of milk [14].

Milk and dairy products, especially low fat products have been shown to help lower risk of type II diabetes [37]. In a meta-analysis of four different studies, there was a 10% reduced risk of type 2 diabetes observed in people who had a higher consumption rate of milk than those who did not, [14]. The possible mechanisms involve calcium and the suppression of a vitamin D receptor that is also described in the mechanism for weight loss [37]. Magnesium is also related to a decrease in diabetes risk through the possible role it plays in glucose homeostasis. However, there has been mixed evidence with this theory [37]. According to Ma, et al. [38], magnesium levels have a strong negative association with insulin sensitivity, but consumption past the designated threshold of 325 mg has no added benefits in relation to insulin sensitivity. On the other hand, a diet rich in calcium appears to help with weight loss specifically in diabetic patients [39].

Weight loss can significantly decrease the risk of stroke diabetes which is a stroke due to diabetic complications, or any heart conditions [40]. High amounts of calcium consumption may play a role in fat loss through a complicated mechanism involving vitamin D. This mechanism causes a suppression of 1, 25-dihydroxyvitamin D_3 which increases the expression of uncoupling

protein 2. This protein is thought to facilitate fatty acid transport and oxidation. Also, when a diet is high in calcium, lipogenesis decreases while lipolysis increases [4]. This process involves a slowing of fat cell production and an increase in the breakdown of fat cells [41].

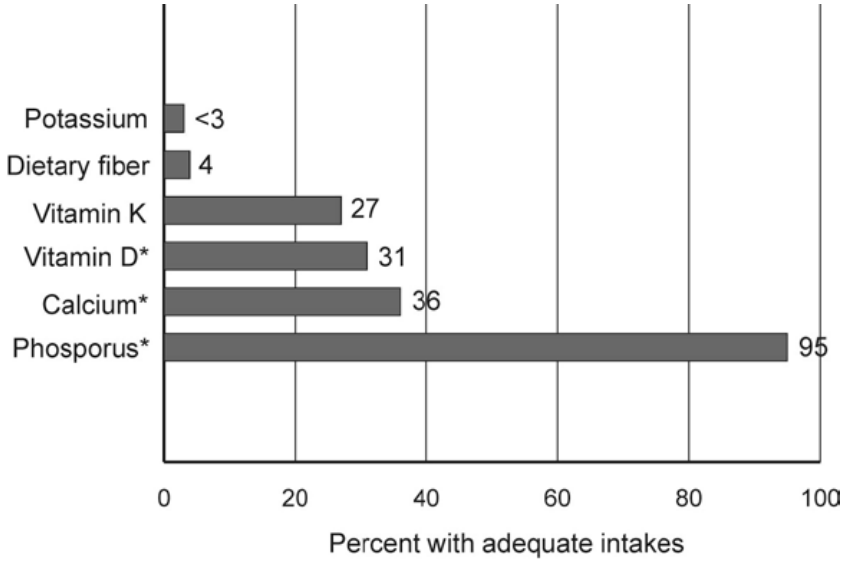
Dairy products have been shown to have more of a positive association with weight loss compared to supplemental calcium [4]. Diets high in low fat and/or nonfat milk are linked to a increased reduction in not only weight, but BMI, waist circumference and WHR [40]. In the study by Zemel, et al. [4], the researchers focused on the effects of dairy calcium of up to 500 kilocalories, compared to supplemental calcium in conjunction with calorie restriction as a means of weight loss in obese adults. Researchers found those who consumed dairy calcium had a significantly higher weight loss than those who used supplements. These findings suggest there may be other beneficial characteristics of dairy products contributing to weight loss [4].

Current Dairy Consumption in the United States

In order to get the maximum benefits from the important nutrients dairy products supply, adults must consume three or more servings of dairy a day [15]. According to the NHANES study [22], the majority of adults in the United States are consuming less than three servings of dairy a day. In fact, a large portion consumes less than one serving of dairy a day [15]. In a 2005 study that took place in Louisiana, about 50% of participants consumed one or less servings of dairy products per day. Around 32% consumed 2 servings, 12% consumed 3 servings, and only 8% consumed 4 or more servings of dairy products [23]. Figure 1 highlights the percentage of Americans who are reaching adequate daily intake of several important nutrients [42]. As such, many Americans are not consuming adequate amounts of essential nutrients. Dairy products are a good source of half these highlighted nutrients, potassium, vitamin D, and calcium [8].

Figure 1

Percentage of Americans who are reaching adequate daily intake of listed nutrients



One of the most recent reports, the Dietary Guidelines for Americans, 2010 indicated usual dairy product intake for adults in the United States is 1.5 servings per day. Those who follow the DASH diet daily consume around 2.6 servings of dairy products and those who consume dairy products based on the USDA food pattern consume 3 servings per day [8]. Figure 2 breaks down, by age group and gender, the typical daily dairy product consumption. The bars in each age group from left to right indicate intakes at the 5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th} and 95^{th} percentiles [42].

The daily recommended intake of calcium for adults is 1000mg for ages 19-50 and 1200mg for ages 51 and older [25]. According to results from Healthy People 2010, 39% of low income households consumed the daily recommended calcium while 48% of higher income households met recommended levels [8]. This has been an ongoing problem in the United States. Over a decade ago, in 1997, only 15% of older adults were meeting the adequate intake for calcium. It should be noted that men consumed twice as much calcium than women.

Figure 2

Typical Daily Dairy Product Consumption in the United States

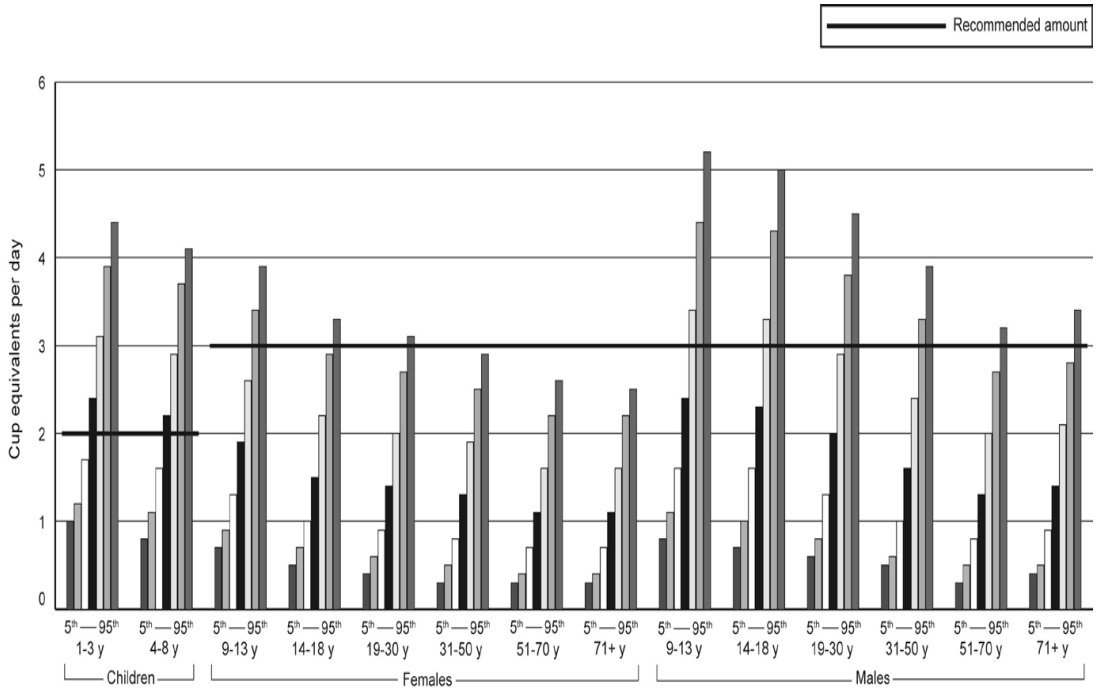
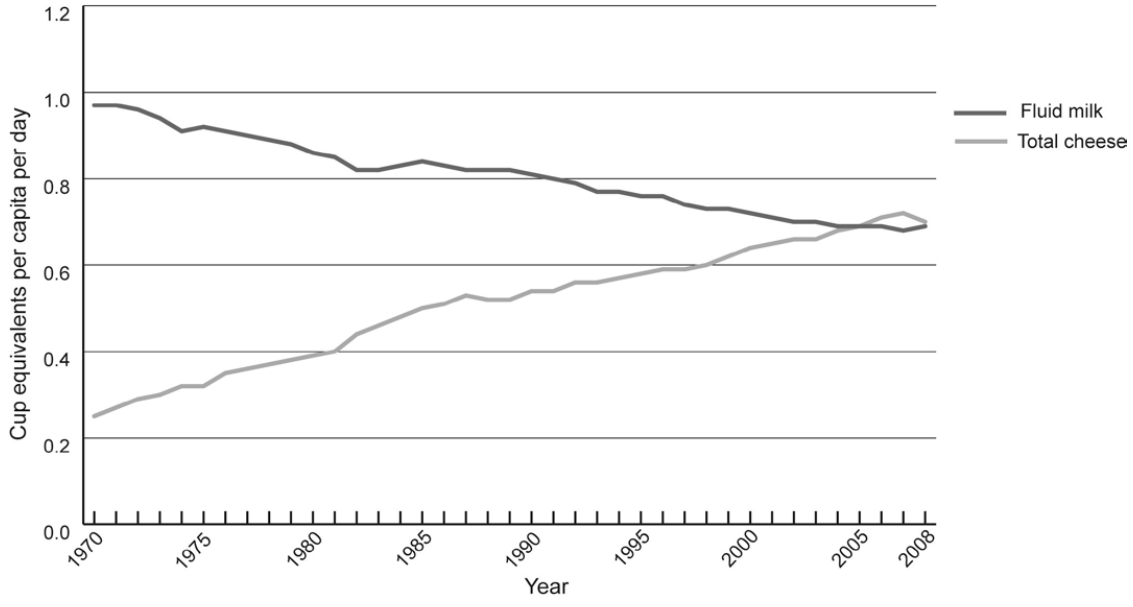


Figure 3

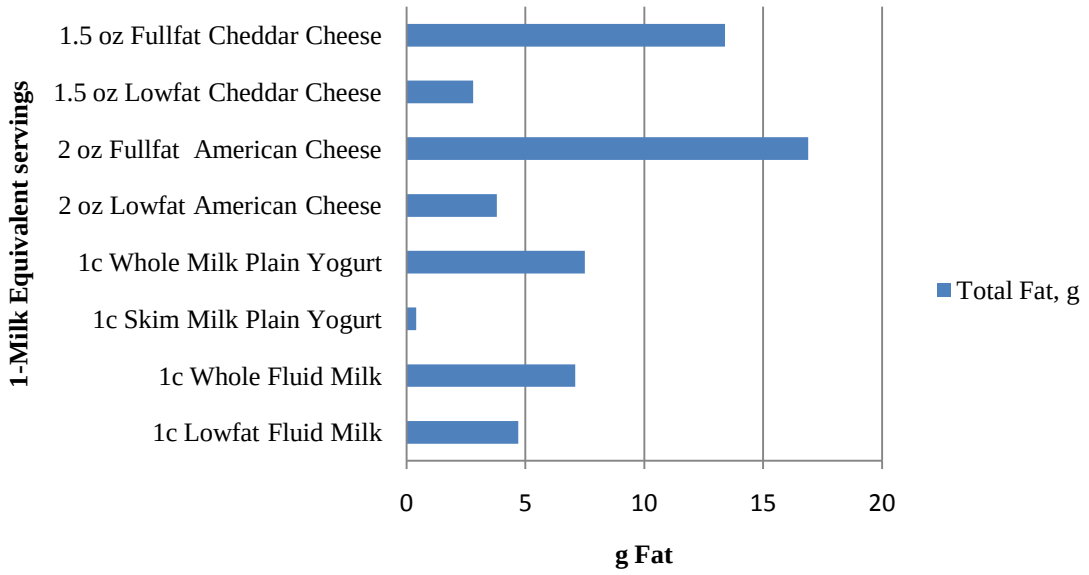
Relative proportions of fluid milk and cheese available for consumption over time



In the United States, cheese consumption appears to be much higher than milk consumption. As Figure 3 shows availability of cheese for consumption has steadily increased since 1970 and has passed milk availability for consumption since 2005 [42]. One statistic showed that, in the last few decades, cheese consumption increased almost threefold [9].

While cheese shares similar beneficial nutrient qualities as milk and yogurt, full fat cheese is much higher in total and saturated fat which can reverse the beneficial effects of dairy consumption. Figure 4 shows a comparison between the fat content of various dairy products measured into 1-milk equivalent servings [43]. Those dairy products with less fat provide the same amount of nutrients, but fewer calories than the full fat options [8]. Also, the 2005 Dietary Guidelines suggest a variety of nonfat/low fat dairy sources, including milk, yogurt, and cheese, in order to receive all the nutritional benefits dairy products have to offer [1]. The 2010 Dietary Guidelines have specifically suggested consumers select more nonfat and low fat milk and yogurt products rather than cheese because they are generally are lower in sodium, cholesterol, and saturated fatty acids while providing more vitamin A, vitamin D, and potassium [8]. Figure 4 shows that low fat cheese is almost 75% lower in total fat than a regular full fat cheese. Regardless, Americans do not typically choose low fat cheeses. Low fat cheese contributes 2% of the calcium consumed in the United States population [42].

Figure 4.
Total Fat Per 1-Milk Equivalent Serving



Socioeconomic status plays a role in dairy foods intake and the variety of dairy products consumed. There has been a positive association between socioeconomic levels and healthful food consumption. Low fat or nonfat dairy products fall into the category of healthful foods [10]. However, there have been some mixed findings related to the type of dairy products consumed and the income or education levels. For example, limited resource families were found to have cheese as the main predictor for their calcium intake [9]. In addition, data taken from the Bogalusa Heart Study [10] found those who consumed more dairy products had more than 12 years of education compared to those with less education. In contrast, the population in the same study showed that dairy product consumption varied very little between income levels. The only variance was in the population that made $15,000 or less and they consumed the least amount of dairy products [10].

Race appears to play a role in dairy product consumption as well. In a study by Hoerr, et al. [9] white mothers and children drank the most milk while Hispanic mothers and children drank less milk and African American mothers and children drank the least milk. The white

families also ate the most cheese, the African American families ate less, and the Hispanic families ate the least amount of cheese. Both African American and Hispanic children were more likely to consume sweetened beverages rather than milk [9]. One possible reason the African Americans families had a lower milk intake is because African Americans are commonly lactose intolerant [10]. This low intake might not be as much of concern because some studies have shown a higher bone density in African Americans compared to other races [9]. Regardless, dairy products have many other beneficial effects on one's health [14] so African Americans should still make an attempt to consume dairy products. The overview of Bogalusa Heart Study population by Deshmukh-Taskar, et al. [10] found that European Americans were much more likely to consume dairy products than African Americans possibly because 90% are able to digest lactose [14].

Overall women have been shown to eat a healthier diet than men. Regardless, Deshmukh-Taskar, et al. [10] found that men and women consumed similar amounts of dairy products in the Bogalusa Heart Study population. Conversely, the Survey for Food Intakes by Individuals showed males ages 12-19 years consumed two times more calcium than females aged 12-19 years. This could be an indicator of dairy intake since dairy products contribute to 72% of the calcium consumed in America [16].

Barriers to Dairy Consumption

Although, there are several barriers contributing to a lack of dairy consumption in America, Fulgoni, et al. [15] suggest that people are more likely to consume dairy products over dark green leafy vegetables, legumes, and calcium fortified orange juice in order to get the adequate nutrients needed for optimal health. And even though one can consume an adequate diet without dairy products, it is extremely hard to do so. Most people who try fall short in several

nutrient categories such as calcium, phosphorus, magnesium, and vitamin D [16]. For this reason, it is very important to overcome the barriers involved with dairy consumption.

There may be difficulty with purchasing and consuming dairy products, but consuming low fat or non fat over whole dairy products seems to be a problem as well [9]. There is a misconception that milk products are too fattening for those who are trying to lose weight [16]. There is also a belief that low fat and nonfat dairy products contain less beneficial nutrients than whole dairy products and are deemed "pointless" [44].

The sense of taste and temperature are important in choosing to consume dairy products. In one study, taste was the main reason people chose to consume dairy products [16]. In another study, the temperature of milk and food matching also contributed to whether or not a person would consume dairy products. For example, a participant in the study stated "on a cold day I like to have my milk warmed up and I like to mix it with coffee". Others stated that milk must be cold to drink it or they only like milk with their cereal [45].

Lastly, lactose intolerance can be a major barrier to dairy consumption [46]. Lactose intolerance is caused by a deficiency in the enzyme lactase which causes an inability to digest lactose, the sugar found in dairy products. Most symptoms occur in the gastrointestinal tract and include cramping and bloating of the stomach along with diarrhea and flatulence [47]. Prevalence of lactose intolerance is hard to determine because of difficulties related to diagnose [48]. For example, there are several other conditions that cause similar symptoms to lactose intolerance such as irritable bowel syndrome or other undiagnosed intestinal problems. However, lactose intolerance does not prevent consumption of dairy foods. There have been studies conducted that show those who have lactose intolerance may be able to consume dairy products without symptoms if the amounts are small or consumed with other foods [48]. Some cheeses and yogurts

contain very little lactose because they contain less whey. Lactose intolerant people can also take lactase to help digest milk or purchase lactose-free milk [16].

There has been a shift in Americans' beverage consumption and eating habits that has resulted in a major decrease in dairy consumption [16]. Over the past 40 years Americans went from consuming four times more milk than soft drinks to 2 1/3 times more soft drinks than milk [16]. Another contributor to the decrease in dairy consumption was increased eating away from home. There is decreased availability of milk choices at restaurants [49] and when consumers went out to eat they viewed this opportunity as a chance to "splurge" leading to an abandonment of healthful eating habits. Lastly skipping meals, particularly breakfast, has been shown to contribute to decreased dairy consumption [16]. Studies have shown those who eat breakfast have a higher consumption of dairy products [50].

Poverty may function as a barrier as well. The national poverty rate in 2009 was 14.3% [51] while the poverty rate in Oklahoma was approximately 15% [52], which puts it as the 13th highest in the country. Assistance programs are available to help those who are not able to afford groceries but many are not utilizing the resource [13]. One major dilemma is many people who are eligible for food assistance, including dairy products, may be unaware they qualify. Others have said the inconvenience of applying for assistance outweighs the benefits. Still others are confused about how these programs work. As such, members of the low-income population might be unable to purchase dairy products, or enough to last between pay periods, if they do not take advantage of these programs.

Nutrition Programs

Due to the recession, the American Dietetic Association believes the availability of food and nutrition programs for adults is of great importance [13]. This not only includes access to health assessments and funding for nutritious foods but also nutrition education [13]. In

Oklahoma, education provided through the Community Nutrition Education Program (CNEP) contributed to a $26 million health care savings in the prevention of diet-related chronic diseases in 2007 [28]. The Community Nutrition Education Programs include two federally funded programs, the Expanded Food and Nutrition Education Program (EFNEP), and Supplemental Nutritional Assistance Program Education (SNAP-Ed). In Oklahoma the SNAP-Ed component is referred to as the Oklahoma Nutrition Program (ONE). EFNEP has been in Oklahoma for over 40 years. The Cooperative State Research, Education, and Extension Service is responsible for this funding through the USDA. Participants eligible to enroll in EFNEP are those families that receive any kind of federal food assistance[12]. The purpose of EFNEP is to help those with limited resources to obtain knowledge, skills, and attitudes needed to have a healthy, nutritionally adequate diet. EFNEP also assists with self-development in order to improve the family's overall diet and well-being. The ONE program has been in operation since the mid 1990's. This program is funded by the Food and Nutrition Service of the USDA [12]. SNAP (formerly known as the Food Stamp program) recipients and people who are SNAP-eligible qualify for participation in the ONE program [12].

The CNEP provide long-term nutrition education to low-income individuals and families through weekly lessons. Participants are able to learn how to make proper nutritional food choices while increasing their ability to select and buy foods to meet their family's needs[53]. For best results, participants enroll in the program for six months to a year in order to master necessary skills [28]. These lessons are led by Nutrition Education Assistants (NEA). NEAs are paraprofessionals chosen from within communities in need and in which they reside. They are known in their communities and recruit families to participate in the program. NEAs also receive referrals from local agencies such as WIC and DHS offices [53]. The lessons are geared toward building skills for preparing more cost efficient, nutritious meals while increasing physical activity. The lessons are research-based and encourage hands-on participation. CNEP helped over

50,000 people in 2009 and is making a difference in the hunger and food statistics of Oklahoma [12].

Conducted through the Oklahoma Cooperative Extension Service, CNEP is found in approximately 44 counties throughout the state. The CNEP partners with WIC, Oklahoma schools, the state and local DHS offices, and emergency food services. The CNEP is successful in making a difference in the nutrition habits of low-income families in Oklahoma [12]. Pre- and Post- tests are given to help determine any changes in behavior while enrolled in the program [28]. Thirty-nine percent of participating families ran out of food less often before the end of the month and 38% reported their children eating breakfast most often. Lastly, 96% of participants showed a positive change by increasing fruits, vegetables, and calcium/dairy foods [12].

Nutrition Programs & Dairy Consumption

Increasing education on the benefits of certain nutrients related to health and techniques to increase consumption of foods containing these nutrients is a way to increase dairy consumption [16]. Nutrition education has been shown to be beneficial in treating and preventing chronic diseases [54]. Another benefit of nutrition education is that it is more cost effective than treating those with possibly preventable chronic diseases [13]. Nutrition knowledge also appears to have a relationship with increased milk consumption [55].

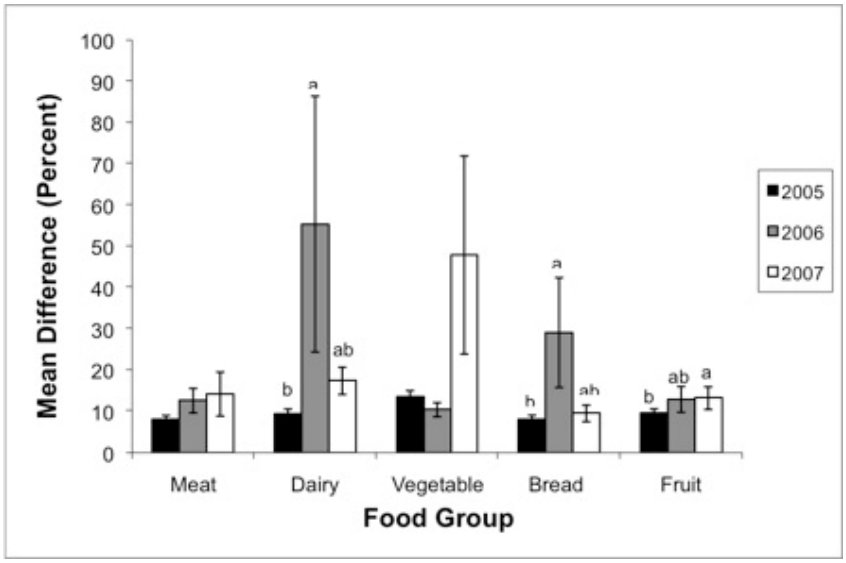
There have been many nutrition education programs targeted towards families with children that have been proven successful [56],[57]. However, there are few programs which specifically focus on nutrition for adults. Another study has shown parents directly influence the dietary intake of their children [9]. It is important to acknowledge the association between parent and child consumption. Since proper nutrition has been associated with healthy aging[54] adult nutrition should be a priority as well. Two programs have shown to be successful in adult nutrition education; one done by members of the Iowa Expanded Food and Nutrition Education

Program (EFNEP) [58] who conducted a study very similar to the "Adults Need Dairy Too" program and the Food Stamp Nutrition Education Program (FSNE) [58].

Iowa EFNEP [58] introduced a revised nutrition education curriculum to program participants from April to September in 2007 and compared it to the previously used curriculum from 2006-2006. These participants were low-income adults, most with young children. The curriculum included a series of eight lessons covering current nutrition and health information. Topics include grocery shopping tips, benefits of vegetable and fruit consumption, choosing whole grains, dairy consumption, lean proteins, and making dietary changes. Knowledge and behavior changes were measured by pre and post tests, 24 hour-dietary recall, and Food Behavior Surveys.

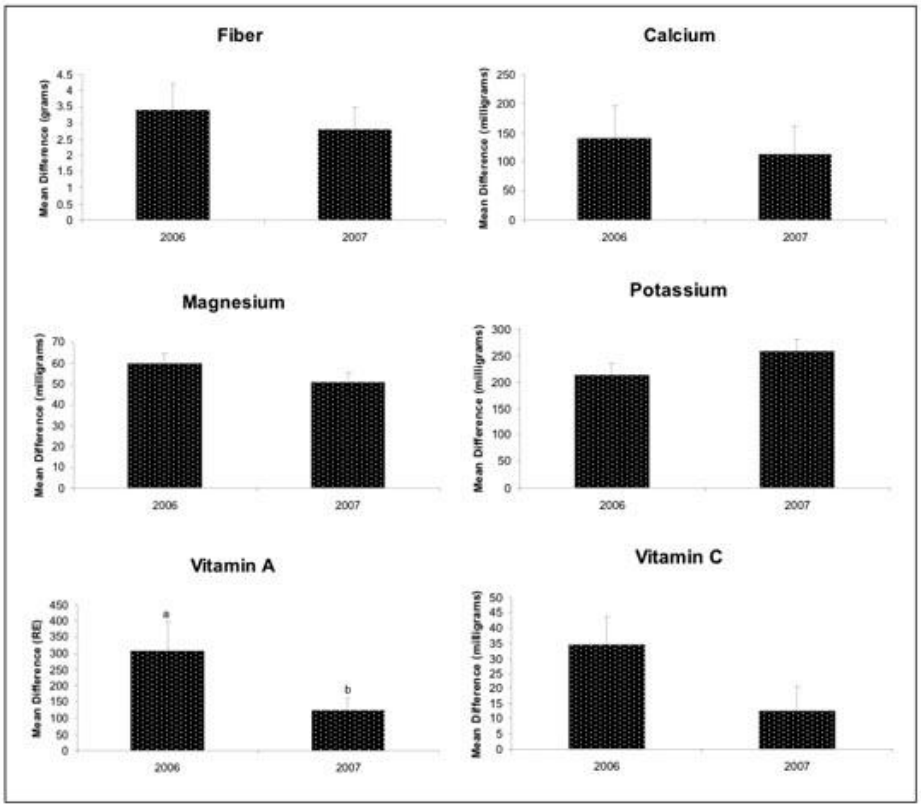
As shown in Figure 5 this curriculum was successful in improving intake for all five food groups. The amount of each bar for each year in the figure indicates the percent change in dietary intake from the year prior. Also, all six micronutrients measured were successfully increased and are listed in Figure 6. For this figure, the amount improved is also in addition to the previous year. Specifically, dairy consumption was measured and improved along with nutrients dairy products contain: calcium, potassium, magnesium, and vitamin A.

Figure 5
Percent Change in Dietary Intakes from Food Groups of EFNEP Participants



a>b p<=0.05

Figure 6
Change in Dietary Intakes from Nutrients of EFNEP Participants



a>b p<=0.05

Instruments for Dietary Assessment

The 24-hour food recalls and food frequency questionnaires are the two most commonly used tests for evaluating program impact. The 24-hour food recalls lists foods actually consumed in a given amount of time. Food frequency questionnaires are overall estimations of food consumption patterns over a longer period of time [61]. Due to a wide variance in different groups' and individuals' food consumption based on time of the day, week, month, or year, there are limitations associated with using any dietary assessment instruments. Specifically, with a 24-hour food recall a record of a few days of consumption does not give an overall picture of a person's typical consumption. Misreporting, especially underreporting, is also a common error found with dietary assessment instruments. As such, energy adjustment appears to be a good method for decreasing the effects of misreporting [62].

CHAPTER III

METHODOLOGY

Research Project

This study was part of a tri-state (Oklahoma, New Mexico, and Texas) research project funded by Southwest Dairy Farmers. Southwest Dairy Farmers is an alliance of dairy farmers from Texas, New Mexico, Arkansas, Kansas, Missouri, and Oklahoma who pool resources to provide consumer education in nutrition, promote dairy product use, and provide dairy product information. The project was developed for limited resource adults to reinforce the importance of consuming milk and other dairy foods. It was designed not only to educate why dairy foods are important for health, but to show participants how to add them to their daily diet and/or change to reduced fat versions.

Participants

Two groups of CNEP participants were compared: group 1 included participants who have completed the current nutrition curriculum and group 2 were those participants who have completed the current nutrition curriculum and received additional training using the "Adults Need Dairy Too" curriculum.

Experimental Design

The design used in this study was a quasi-experimental pre, post design.

Description of Intervention

A series of six lessons were developed which focused on the importance of dairy and included tips and recipes to help incorporate low fat dairy product consumption into the diet on a daily basis. The lessons included information on dairy products including fluid milk, dry milk, cheese, and yogurt. They also covered food safety, storage, serving sizes, nutrition information, ways to incorporate dairy on a daily basis, an opportunity to sample healthful dairy products and easy to prepare economical recipes. Lessons were taught by a combination of lecture, demonstration, and participatory learning. Nutrition Education Assistants were trained to reduce variance between sites.

The six lessons and key concepts included:

1) *Breakfast: Delight in Dairy Daily* focused on incorporating dairy into breakfast daily by providing tips and quick recipes and emphasizing the importance of eating breakfast.
2) *Dairy All Day* highlighted ways to add dairy foods to the diet through snacks and beverages. This lesson provided snack and beverage ideas and stressed the importance of calorie intake at snack time.
3) *Keep Dairy Safe* provided information on safe storage of dairy, how to bring dairy home from the grocery store, how to safely take dairy as a later snack, and how to tell when dairy products have spoiled.

4) *Buying Dairy: Make the Right Choice* demonstrated ways to shop cost effectively by unit pricing and to determine the correct size for individual needs. Nonfat dry milk was covered along with ways to incorporating it into cooking.
5) *Milk: Make it easy* was an overview of fluid milk in regards to the amount needed on a daily basis and tips for making a switch to lower fat content milk products.
6) *Cheese: Know the Facts* was an overview of different types of cheeses and what makes them different. Fat content is discussed along with serving sizes and tips for cooking with cheese.

Design and Intervention Procedure

A 24-hour food recall was administered at enrollment and upon program graduation, specifically to record the number of dairy servings per day. A subgroup of CNEP participants (the treatment group) received training using "Adults Need Dairy Too" curriculum in addition to the existing curriculum.

The Oklahoma State University Review Board (IRB) determined this project qualified as a nonhuman subject research as defined in 45 CFR 46.102 (d) and (f) and was not subject to oversight by the OSU IRB.

To minimize variability in teaching styles, NEAs were trained to teach the "Adults Need Dairy Too" program series to treatment groups. NEAs were also trained to conduct 24-hour food recalls. Participants in both the control and treatment groups completed the same pre/post 24-hour food recalls.

Instrument

Pre and post 24-hour food recalls were given to both groups in order to measure dietary changes in regards to dairy consumption. The Mypyramid.gov guidelines were used to count the milk-equivalent servings. For example, 1 cup of milk or yogurt, 1/3 cup of shredded cheese, 2

cups of cottage cheese, or 1 cup of pudding made with whole milk is considered a milk equivalent [63]. Foods such as cereals, sandwiches, and pizzas, milk equivalents were not assumed. Servings were only counted if they were listed on the food recall.

Data Analysis

Data was analyzed using the Statistical Program for Social Sciences (SPSS). Descriptive statistics such as age and sex was used to describe the demographic information of the control and intervention groups. Analysis of variance (ANOVA) was used to identify significant differences in degree of behavior change between participants who experienced the "Adults Need Dairy Too" program and those that did not. The paired T test was used to measure the change in dairy consumption before and after the original CNEP lessons along with the additional dairy lessons for the treatment group and before and after the original CNEP lessons for the control group (Table 2). The paired T test was also used to determine if participants who experienced the additional dairy education had a greater behavior change than those who did not.

Table 2. Study Design

	Control	**Treatment**
Pre	Registration 24-Hour Food Recall	Registration 24-Hour Food Recall
Lessons	CNEP lessons	CNEP lessons ANDT program
Post	24-Hour Food Recall	24-Hour Food Recall

CHAPTER IV

RESULTS & DISCUSSION

All participants who completed both the pre and post 24-hour food recall were included in the data analysis. Of the 121 participants, 41 were in the control group and 80 were in the treatment group (see Table 3 for demographic information).

Table 3. Demographic Information.

	Control (n=41)	**Treatment (n=80)**
	n(%)*	n(%)*
Gender		
Male	10(24)	20(25)
Female	31(76)	60(75)
Age Group		
1-19	12(29)	0(0)
20-29	3(7)	8(10)
30-39	3(7)	14(18)
40-49	5(12)	13(16)
50-59	3(7)	15(19)
60-69	2(5)	13(16)
70-79	4(10)	11(14)
80+	9(22)	6(8)

*Column % may not total 100% due to rounding.

The frequency of the number of milk equivalents consumed before and after additional dairy education are summarized in Table 4. The change in the mean number of milk equivalents consumed before and after additional dairy education and the percent increase in consumption from pre to post test are summarized in Table 5.

Table 4. Frequency of the Number of Milk Equivalents Consumed Before and After Additional Dairy Education.

	Milk Equivalent Servings	Pretest	Post Test
		n(%)*	n(%)*
Control (n=41)			
	0<1	14(34)	10(24)
	1<2	14(34)	18(44)
	2<3	9(22)	10(24)
	≥3	4(10)	3(7)
Treatment (n=80)			
	0<1	41(51)	51(64)
	1<2	30(38)	20(25)
	2<3	6(8)	6(8)
	≥3	3(4)	3(4)

*Column % may not total 100% due to rounding

Table 5. Change in the Mean Number of Milk Equivalents Consumed Before and After Additional Dairy Education and Percent Increased Consumption from Pre to Post Test.

	Control	Treatment	
	(Mean ±Standard Error)	(Mean ±Standard Error)	Pr ≤ |t|
Pretest	1.35±0.15	0.86±0.10	0.92
Post Test	1.47±0.14	0.88±0.15	0.92
Change	0.11±0.21	0.02±0.18	0.72
% Increase	54%	36%	

According to the paired t test, no significant differences were observed in the frequency of CNEP participants experiencing the ANDT program and those who did not between the treatment and control groups at pre and post dairy consumption (Table 4). The p-value for the treatment group was 0.92 and for the control group the p-value was 0.54. There was no significant difference in the frequency of the change between the CNEP participants who experienced the additional dairy curriculum and those who did not in their pre and post dairy consumption (Table 5).

Milk equivalent servings consumed at pre and post 24-hour food recalls

At pre 24-hour food recall of the 41 participants in the control group, 14 (34%) consumed less than one serving, 14 (34%) consumed more than one/less than two servings, 9 (22%) consumed more than two/ less than three servings, and 4 (10%) consumed three or more servings. Of the 80 participants in the treatment group, 41 (51%) consumed less than one serving, 30 (38%) consumed more than one/less than two servings, 6 (8%) consumed more than two/ less than three servings, and 3(4%) consumed three or more servings (Table 4).

At post 24-hour food recall of the 41 participants in the control group, 10 (24%) consumed less than one serving, 18 (44%) consumed more than one/less two servings, 10 (24%) consumed more than two/less than three servings, 3 (7%) consumed three or more servings. Of the 81 participants in the treatment group, 51 (64%) consumed less than one serving, 20 (25%) consumed more than one/less two servings, 6 (8%) consumed more than two/less than three servings, 3 (4%) consumed three or more servings (Table 4).

Changes in milk equivalent serving consumption from pre to post

In the control group, 4 participants consumed one or less servings at pre that did not at post (“decrease”), 4 participants consumed more than one/less than two servings at post that did not at pre (“increase”), one participant consumed more than two/less than three servings at post

that did not at pre (“increase”), and one participant consumed more than three servings at pre that did not at post (“decrease”) (Table 4).

In the treatment group, 10 participants consumed one or less servings at post that did not at pre (“increase”), 10 participants consumed more than one/less than two servings at pre that did not at post (“decrease”), 6 participants consumed more than two/less than three servings at both pre and post (“same”), and 3 participants consumed more than three servings at both pre and post (“same”) (Table 4).

Discussion

This study evaluated the effectiveness of the “Adults Need Dairy Too” program in addition to the regular CNEP curriculum for increasing dairy consumption in a low-income adult population. The results of this study indicate the additional dairy education provided did not increase CNEP participants’ dairy consumption. The results may be influenced by several factors such as the time of the month the 24-hour food recalls were recorded, population size differences between control and treatment groups, age group differences between the control and treatment groups, lack of specificity in the 24-hour food recall recording, and more than one NEA teaching the curriculum and recording the 24-hour food recalls.

Participants in the CNEP program receive monthly financial assistance to supplement their resources for purchasing groceries. The amount is based on the participant’s family size and income [6]. It is possible that participants use all their grocery money before the end of the month. Foods, such as dairy products, might not be purchased without the additional money participants receive for groceries. If the 24-hour food recalls were recorded at different times of the month for the different groups this could greatly affect the results. For example, the participants in the treatment group who consumed less than one milk equivalent serving increased

from 51% to 65% of the total sample. This change may indicate that the food recall recording was taken towards the end of the month when dairy purchase might not have been possible.

Inconsistent and incomplete 24-hour food recalls made data analysis difficult. Foods such as pizza, sandwiches, and cereal, which typically contain cheese or milk, did not have each ingredient listed including cheese or milk on some of the foods entered into the food recalls. There were no assumptions made by researchers regarding the dairy content of these foods. These specific foods were popular among both the control and treatment groups. If the additional ingredients were listed there might have been a notable difference in dairy consumption.

Although the NEAs were trained how to teach the lessons (both the original CNEP lesson and the ANDT lessons) and how to conduct a 24-hour food recall for consistency, inconsistencies still occur. Educator race and experience and instructional situations have shown to be a factor in food behavior changes in an EFNEP setting as well [64]. This was the first time the NEAs in the treatment groups had used the ANDT curriculum. Lack of confidence in the subject is another factor to consider. The NEA's different personalities and teaching styles along with the participants' willingness/ability to learn could have also played a part in the lack of behavior change.

Furthermore, the control group data came from one NEA's group while the treatment group consisted of 3 different NEAs' groups. The control group NEA may or may not have recorded the recalls more accurately or may have been more successful with their teaching techniques. One treatment group NEA may have been more successful while another treatment NEA was not which would cancel each other out. Same goes for the participants, the control group and one of the treatment groups might have been more eager or willing to learn while another treatment group was not.

The population size might have skewed the results. The control group was half the size of the treatment group. The outcome might have been completely different if 40 more control recalls were collected and analyzed especially if those participants came from another NEA's group.

The age difference between the control and treatment group is a factor to consider. As Figure 2 shows younger populations consume typically consume higher amounts of dairy products compared to the middle aged population. The control group consisted of a greater number of participants aged 30 years and younger while the treatment group consisted of more middle aged participants.

Lastly, the control group had higher dairy consumption at the pre recall compared to the treatment group. This finding may indicate that the control was more likely to have a higher consumption rate at the post recall as well.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary

The purpose of this study was to measure the impact of ANDT program implemented with a limited resource adult population enrolled in CNEP in Oklahoma. Specifically the purpose was to determine if participation in the program increased low fat dairy intake.

Null hypothesis one states that there would be no significant difference in the frequency of the CNEP participants' consumption of one milk equivalent servings after the completion of the ANDT curriculum. There were no significant differences noted in the frequency of CNEP participants who experienced the ANDT curriculum in their dairy consumption. As a result, null hypothesis one is not rejected.

Null hypothesis two stated there would be no significant difference between the frequencies of the CNEP ANDT curriculum participants' and the CNEP non-ANDT curriculum participants' consumption of one milk equivalent servings. There were no significant differences noted in the frequency between the CNEP participants who experienced the ANDT curriculum and the CNEP participants who did not in their dairy consumption. As a result, null hypothesis two is not rejected.

Conclusion

Intervention nutrition programs highlighted in the literature review were shown to be successful in increasing consumption of the food groups of interest. However, the ADNT program did not increase CNEP participants' dairy consumption. There were several constraints with the study design that could have contributed to the results. These limitations included the time of the month the 24-hour food recalls were recorded, lack of specificity in the 24-hour food recall recording, and more than one NEA teaching the curriculum and recording the food recalls.

Recommendations

The evaluation of the ANDT program was limited. If the current program were to be used in another study, the researcher recommends a change in format for data collection. To compensate for lack of finances towards the end of the month for many participants, 24-hour food recalls should be conducted at the same time of the month consistently between the control and treatment groups. Also, when the NEAs are trained for the use of the new program, they should be shown how to list specific ingredients in different foods when conducting the 24-hour food recalls. Lastly, multiple 24-hour food recalls throughout the program or using food frequency questionnaires, in addition to a 24-hour food recall, would be helpful in obtaining an overall picture of the actual consumption of the participants.

In addition to 24-hour food recalls, the researcher recommends focus groups for both the participants and the NEAs in order to discuss ways to improve the ANDT program. The discussion could include length of the lessons, the number of lessons, the acceptability, usefulness of recipes demonstrated, and food samples given during the lessons, to name a few topics. Displays have been developed and more visually appealing handouts have been created. Both of these additions might also contribute to more successful ANDT program outcomes.

REFERENCES

1. **Dietary Guidelines for Americans [http://www.health.gov/dietaryguidelines/dga2005/document/]**
2. **Gerrior S, Bente, L., & Hiza, H.: Nutrient Content of the U.S. Food Supply, 1909-2000. In.: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion; 2004: 1-158.**
3. **Heaney RP: Calcium, dairy products and osteoporosis. *J Am Coll Nutr* 2000, 19(2 Suppl):83S-99S.**
4. **Zemel MB, Thompson W, Milstead A, Morris K, Campbell P: Calcium and dairy acceleration of weight and fat loss during energy restriction in obese adults. *Obes Res* 2004, 12(4):582-590.**
5. **Worsley A: Nutrition knowledge and food consumption: can nutrition knowledge change food behaviour? *Asia Pac J Clin Nutr* 2002, 11 Suppl 3:S579-585.**
6. **Dietary Intake and Dietary Attitudes Among Food Stamp Participants and Other Low-Income Individuals [http://www.fns.usda.gov/ora/MENU/Published/NutritionEducation/Files/FSPDietSum.htm]**
7. **CDC: US Obesity Trends. Atlanta 2010.**
8. **Dietary Guidelines for Americans, 2010 [www.dietaryguidelines.gov]**
9. **Hoerr SL, Nicklas TA, Franklin F, Liu Y: Predictors of calcium intake at dinner meals of ethnically diverse mother-child dyads from families with limited incomes. *J Am Diet Assoc* 2009, 109(10):1744-1750.**
10. **Deshmukh-Taskar P, Nicklas TA, Yang SJ, Berenson GS: Does food group consumption vary by differences in socioeconomic, demographic, and lifestyle factors in young adults? The Bogalusa Heart Study. *J Am Diet Assoc* 2007, 107(2):223-234.**
11. **Serdula MK, Ivery D, Coates RJ, Freedman DS, Williamson DF, Byers T: Do obese children become obese adults? A review of the literature. *Prev Med* 1993, 22(2):167-177.**
12. **Community Nutrition Education Programs (CNEP) [http://www.fcs.okstate.edu/cnep/about/]**
13. **Kamp BJ, Wellman NS, Russell C: Position of the American Dietetic Association, American Society for Nutrition, and Society for Nutrition Education: Food and nutrition programs for community-residing older adults. *J Am Diet Assoc* 2010, 110(3):463-472.**
14. **Elwood PC, Givens DI, Beswick AD, Fehily AM, Pickering JE, Gallacher J: The survival advantage of milk and dairy consumption: an overview of evidence from cohort studies of vascular diseases, diabetes and cancer. *J Am Coll Nutr* 2008, 27(6):723S-734S.**
15. **Fulgoni VL, 3rd, Huth PJ, DiRienzo DB, Miller GD: Determination of the optimal number of dairy servings to ensure a low prevalence of inadequate calcium intake in Americans. *J Am Coll Nutr* 2004, 23(6):651-659.**

16. **Miller GD, Jarvis JK, McBean LD: The importance of meeting calcium needs with foods. *J Am Coll Nutr* 2001, 20(2 Suppl):168S-185S.**
17. **Martini L, Wood RJ: Relative bioavailability of calcium-rich dietary sources in the elderly. *Am J Clin Nutr* 2002, 76(6):1345-1350.**
18. **Wolf RL, Cauley JA, Baker CE, Ferrell RE, Charron M, Caggiula AW, Salamone LM, Heaney RP, Kuller LH: Factors associated with calcium absorption efficiency in pre- and perimenopausal women. *Am J Clin Nutr* 2000, 72(2):466-471.**
19. **Hulmi JJ, Lockwood CM, Stout JR: Effect of protein/essential amino acids and resistance training on skeletal muscle hypertrophy: A case for whey protein. *Nutr Metab (Lond)* 2010, 7:51.**
20. **McBean LD, MS, RD: Dietary Protein's Role in Healthy Aging. In: *Dairy Council Digest.* Edited by McBean LD, MS, RD, vol. 81. Rosemont, IL: National Dairy Council 2010: 7-12.**
21. **McGill CR, Fulgoni VL, 3rd, DiRienzo D, Huth PJ, Kurilich AC, Miller GD: Contribution of dairy products to dietary potassium intake in the United States population. *J Am Coll Nutr* 2008, 27(1):44-50.**
22. **Nicklas TA, O'Neil CE, Fulgoni VL, 3rd: The role of dairy in meeting the recommendations for shortfall nutrients in the American diet. *J Am Coll Nutr* 2009, 28 Suppl 1:73S-81S.**
23. **Ranganathan R, Nicklas TA, Yang SJ, Berenson GS: The nutritional impact of dairy product consumption on dietary intakes of adults (1995-1996): the Bogalusa Heart Study. *J Am Diet Assoc* 2005, 105(9):1391-1400.**
24. **Additional Requirements for Nutrient Content Claims [http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/FoodLabelingNutrition/FoodLabelingGuide/ucm064916.htm]**
25. **Recommended Intakes for Individuals, Elements [http://iom.edu/en/Global/News%20Announcements/~/media/Files/Activity%20Files/Nutrition/DRIs/DRISummaryListing2.ashx]**
26. **Gueguen L, Pointillart A: The bioavailability of dietary calcium. *J Am Coll Nutr* 2000, 19(2 Suppl):119S-136S.**
27. **Kelly P, Shawa T, Mwanamakondo S, Soko R, Smith G, Barclay GR, Sanderson IR: Gastric and intestinal barrier impairment in tropical enteropathy and HIV: limited impact of micronutrient supplementation during a randomised controlled trial. *BMC Gastroenterol* 2010, 10:72.**
28. **Muske G: Community Nutrition Education Programs Help Stretch Food Dollars. In: *Focus on Community Nutrition Education Programs***

Stillwater Oklahoma Cooperative Extension Service/ Oklahoma State University 2008: 1-4.
29. **Power ML, Heaney RP, Kalkwarf HJ, Pitkin RM, Repke JT, Tsang RC, Schulkin J: The role of calcium in health and disease. *Am J Obstet Gynecol* 1999, 181(6):1560-1569.**
30. **Wosje KS, Specker BL: Role of calcium in bone health during childhood. *Nutr Rev* 2000, 58(9):253-268.**

31. **McCarron DA: Role of adequate dietary calcium intake in the prevention and management of salt-sensitive hypertension. *Am J Clin Nutr* 1997, 65(2 Suppl):712S-716S.**
32. **Morris RC, Jr., Schmidlin O, Frassetto LA, Sebastian A: Relationship and interaction between sodium and potassium. *J Am Coll Nutr* 2006, 25(3 Suppl):262S-270S.**
33. **Houston MC, Harper KJ: Potassium, magnesium, and calcium: their role in both the cause and treatment of hypertension. *J Clin Hypertens (Greenwich)* 2008, 10(7 Suppl 2):3-11.**
34. **Harsha DW, Lin PH, Obarzanek E, Karanja NM, Moore TJ, Caballero B: Dietary Approaches to Stop Hypertension: a summary of study results. DASH Collaborative Research Group. *J Am Diet Assoc* 1999, 99(8 Suppl):S35-39.**
35. **Yoo S, Nicklas T, Baranowski T, Zakeri IF, Yang SJ, Srinivasan SR, Berenson GS: Comparison of dietary intakes associated with metabolic syndrome risk factors in young adults: the Bogalusa Heart Study. *Am J Clin Nutr* 2004, 80(4):841-848.**
36. **Hu FB, Stampfer MJ, Manson JE, Ascherio A, Colditz GA, Speizer FE, Hennekens CH, Willett WC: Dietary saturated fats and their food sources in relation to the risk of coronary heart disease in women. *Am J Clin Nutr* 1999, 70(6):1001-1008.**
37. **Martini LA, Wood RJ: Milk intake and the risk of type 2 diabetes mellitus, hypertension and prostate cancer. *Arq Bras Endocrinol Metabol* 2009, 53(5):688-694.**
38. **Ma B, Lawson AB, Liese AD, Bell RA, Mayer-Davis EJ: Dairy, magnesium, and calcium intake in relation to insulin sensitivity: approaches to modeling a dose-dependent association. *Am J Epidemiol* 2006, 164(5):449-458.**
39. **Shahar DR, Abel R, Elhayany A, Vardi H, Fraser D: Does dairy calcium intake enhance weight loss among overweight diabetic patients? *Diabetes Care* 2007, 30(3):485-489.**
40. **Faghih S, Abadi AR, Hedayati M, Kimiagar SM: Comparison of the effects of cows' milk, fortified soy milk, and calcium supplement on weight and fat loss in premenopausal overweight and obese women. *Nutr Metab Cardiovasc Dis* 2010.**
41. **Ducharme NA, Bickel PE: Lipid droplets in lipogenesis and lipolysis. *Endocrinology* 2008, 149(3):942-949.**
42. **Service AR: Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans, 2010. In. Edited by Agriculture HaHS; 2010.**
43. **Nutrient Data Laboratory [http://nal.usda.gov/fnic/foodcomp/search/]**
44. **American Academy of Pediatrics CoN: Calcium requirements of infants, children, and adolescents. . In: *Pediatrics.* 1999: 1152-1157.**
45. **Novotny R HJ, Biernacke I: Motivators and barriers to consuming calcium-rich foods among Asian adolescents in Hawaii. *J of Nutr Educ* 1999, 31(2):99-104.**

46. **Honkanen R, Kroger H, Alhava E, Turpeinen P, Tuppurainen M, Saarikoski S: Lactose intolerance associated with fractures of weight-bearing bones in Finnish women aged 38-57 years. *Bone* 1997, 21(6):473-477.**
47. **Jellema P, Schellevis FG, van der Windt DA, Kneepkens CM, van der Horst HE: Lactose malabsorption and intolerance: a systematic review on the diagnostic value of gastrointestinal symptoms and self-reported milk intolerance. *QJM* 2010, 103(8):555-572.**
48. **Wilt TJ, Shaukat A, Shamliyan T, Taylor BC, MacDonald R, Tacklind J, Rutks I, Schwarzenberg SJ, Kane RL, Levitt M: Lactose intolerance and health. *Evid Rep Technol Assess (Full Rep)* 2010(192):1-410.**
49. **Haines PS, Hungerford DW, Popkin BM, Guilkey DK: Eating patterns and energy and nutrient intakes of US women. *J Am Diet Assoc* 1992, 92(6):698-704, 707.**
50. **Basiotis PP LM, Anand RS: Eating breakfast greatly improves children's diet quality. *Nutr Insights* 1999, 15:1-2.**
51. **Income, Poverty and Health Insurance [http://www.census.gov/hhes/www/poverty/data/incpovhlth/2009/tables.html]**
52. **State Facts Sheet: Oklahoma [http://www.ers.usda.gov/statefacts/ok.htm]**
53. **Services OCE: EFNEP. In. Edited by Unitveristy OS. Stillwater, OK; 2009.**
54. **Beneficiaries. IoMCoNSfM: The Role of Nutrition in Maintaining Health in the Nation's Elderly In: *Evaluating Coverage of Nutrition Services for the Medicare Population* Washington, DC: National Academy Press; 2000.**
55. **Elbon SM, Johnson MA, Fischer JG: Milk consumption in older Americans. *Am J Public Health* 1998, 88(8):1221-1224.**
56. **Howerton MW, Bell BS, Dodd KW, Berrigan D, Stolzenberg-Solomon R, Nebeling L: School-based nutrition programs produced a moderate increase in fruit and vegetable consumption: meta and pooling analyses from 7 studies. *J Nutr Educ Behav* 2007, 39(4):186-196.**
57. **Reynolds KD, Franklin FA, Binkley D, Raczynski JM, Harrington KF, Kirk KA, Person S: Increasing the fruit and vegetable consumption of fourth-graders: results from the high 5 project. *Prev Med* 2000, 30(4):309-319.**
58. **Hoover JR MP, & Litchfield: Evaluation of a New Nutrition Education Curriculum and Factors Influencing Its Implementation. *Journal of Extension* 2009, 47(1FEA4):1-14.**
59. **Landers PS: The Food Stamp Program: history, nutrition education, and impact. *J Am Diet Assoc* 2007, 107(11):1945-1951.**
60. **USDA: Supplemental Nutrition Assistance Program: Number of Persons Participating. In. Edited by http://www.fns.usda.gov/pd/29SNAPcurrPP.htm; 2010.**
61. **Pereira RA, Araujo MC, Lopes Tde S, Yokoo EM: How many 24-hour recalls or food records are required to estimate usual energy and nutrient intake? *Cad Saude Publica* 2010, 26(11):2101-2111.**
62. **Poslusna K, Ruprich J, de Vries JH, Jakubikova M, van't Veer P: Misreporting of energy and micronutrient intake estimated by food records and 24 hour recalls, control and adjustment methods in practice. *Br J Nutr* 2009, 101 Suppl 2:S73-85.**

63. What Counts as 1 Cup in the Milk Group? [http://www.mypyramid.gov/pyramid/milk_counts.html]

64. Hoover JR MP, & Litchfield Evaluation of a New Nutrition Education Curriculum and Factors Influencing Its Implementation *Journal of Extension* 2009, 47(1FEA4):1-14.

APPPENDICES

ADULTS NEED DAIRY TOO LESSON PLANS AND LESSON POWERPOINTS
ADULTS NEED DAIRY TOO HANDOUTS AND RECIPES
IRB FORM FOR NON HUMAN RESEARCH

Lesson plan: Buying Dairy

Materials and equipment needed:
Computer and projector
Extension cord if necessary
PowerPoint slides
2 heating surfaces
2 medium cooking pans
2 large ladles
4-ounce size plastic cups for tasting non-fat dry milk
8-ounce drinking cups
Disposable plastic spoons
Disposable bowls
Paper towels
Paper table cloth
Ice chest
1/3c, 3/4c & 1c Measuring cups
Large spoon
Paper or note cards
Pencils
Pitcher

Handouts to prepare:
Nonfat Dry Milk handout
Add Dairy Daily handout

Before the lesson:
No less than 3 hours prior to lesson:
Mix and chill nonfat dry milk. Make enough for class members to have 3 ounces. 1 quart = 8 tasters.
Store in ice chest or refrigerator until needed

Foods needed:
Nonfat dry milk
1% low-fat milk
Condensed low sodium tomato soup
Ice for ice chest
Pitcher of water

Adults Need Dairy Too!

Activities during the lesson:

#1 Reconstituting Nonfat dry milk You need measuring cups, water, spoon, non-fat dry milk, tasting cups

Demonstrate how to mix non-fat dry milk following recipe on slide. Serve the chilled nonfat dry milk made prior to lesson for tasting. Chilled to ensure a better tasting sample!

Compare the cost of the reconstituted milk with an equal amount of fat-free milk. Ask participants if it would be a way their family would choose to save on groceries.

#2 Tasting the Difference You need 2 heating surfaces, 2 pans, 2 ladles, disposable bowls and spoons for sampling, 1% milk, reconstituted nonfat dry milk

Make 2 separate pans of condensed tomato soup, one with 1% low-fat milk and the other with reconstituted nonfat dry milk—follow instructions on can.
Label pans A and B and let participants serve themselves without knowing which is which.
Ask for a show of hands for who preferred each soup. Then let them know which is made with which type of milk.

Adults Need Dairy Too!

Buying Dairy
Make the right choice!

Today we'll talk about…

- Comparing dairy product costs and how to pick the best fit for your family
- What size container of milk, yogurt or cheese is the best buy
- Fitting instant nonfat dry milk into your budget and family meals
- Comparing the taste of fluid milk with instant nonfat dry milk

Discussion

Don't let dairy be costly

- Do you know some good ways to save money on milk?
- What about cheese?
- What about with yogurt?

Compare product costs using unit pricing

- Many stores include the "unit price" on the shelf tag for each food
  - When comparing 2 or more similar dairy foods, buy the one with the lowest unit price when possible
    - Sometimes the unit price is lower but the entire package is more expensive

What size milk carton is the best buy?

- Usually, when you compare the unit cost a gallon is cheaper than a half gallon
- BUT actual cost depends on how much you drink
  - Do you often throw out spoiled milk?
  - Buying a half gallon might prevent wasting milk and money

Group activity

Milk math

- Reduced fat milk costs $3 per gallon or $2 per 1/2 gallon, which is the best buy?
- What if you only drink half of the gallon that cost $3 before it spoils?
  - Did you save money?
- Which size should you buy?
  - It depends on you and your family and how much milk you drink

Consider brand options

- Lesser known brands may cost less than national brands
- The price and the label may be the only difference
- Compare unit prices before buying

Instant Nonfat dry milk (NFDM)

- Handy when you run out of fluid milk or refrigeration isn't available
  - Mix with water as needed
  - May reduce wasted milk
- As nutritious as fluid fat free milk
  - To add more dairy to the diet add NFDM to meat loaf, milk drinks, cream soups, and pudding recipes
- Less taste difference when used in baking or cooking

Source: http://wellnessways.aces.illinois.edu/commodity/tg_instnfdm.pdf

Activity

Fitting NFDM into the budget

- Who has bought and tried NFDM?
- When purchased, the cost of the package is more than fluid milk
  - Compare cost of reconstituted dry milk to equal amount of fluid fatfree milk
  - Can save money in the long run

Source: http://wellnessways.aces.illinois.edu/commodity/tg_instnfdm.pdf

Demonstration

Mixing NFDM

1. Mix and chill a few hours before drinking for the best taste
2. Combine water and powder in jar or container with a tight-fighting lid
3. Shake well

Recipe ratios

- 1 cup milk = 1/3 cup NFDM + 1 cup water
- 1 quart milk = 1-1/3 cups NFDM + 4 cups water

Source: http://wellnessways.aces.illinois.edu/commodity/tg_instnfdm.pdf

Safe handling & storage of NFDM

- Store unopened powder in a cool, dry place
  - No longer than the "Best if Used By" date or 18 months
- Store opened NFDM in a tightly covered container in a cool, dry place until needed
  - After mixing NFDM powder with water, cover, refrigerate and use within 3 to 5 days

Source: http://wellnessways.aces.illinois.edu/commodity/tg_instnfdm.pdf

Activity: Cream of Tomato Soup

Can you tell the difference?

- Taste samples
  - Was there a difference in taste?
  - Which did you like more?
  - Which was made with fluid milk and which with reconstituted instant nonfat dry milk?
  - Would this be something you would try with your family?

More ways to add NFDM to family foods

- Baking—Add 2 tablespoons per cup flour
- Cooked cereals—Add 2 tablespoons for each 1/2 cup of dry cereal
- Coffee or tea—Use in place of non-dairy coffee creamer
- Canned soups—Add 1/2 cup powder + 10 3/4-ounce canned soup + 1 can water
- Mashed potatoes—Add 1/4 cup for each serving of mashed potatoes

Source: http://wellnessways.aces.illinois.edu/commodity/tg_instnfdm.pdf

Review

Today we talked about:

- How to compare the cost of different dairy foods
- Knowing which size of food package to choose based on amount eaten, size, and price
- How to mix instant nonfat dry milk and add it into foods

Goals for the week—pick 1 or make up 1 of your own

- Find the cost per unit tag in the grocery store and compare costs
- Buy and let your family try nonfat dry milk.
  - Sneak it into recipes and see if they notice the difference
- Make a list of foods you waste because they spoil before you finish them → buy a smaller size this week

Any questions or comments?

"Adult Need Dairy Too!" Is a joint project of the Cooperative Extension Services in Oklahoma, New Mexico and Texas and is partially funded by Southwest Dairy Farmers.

Lesson plan: Cheese 101

Materials and equipment needed:
Computer and projector
Extension cord if necessary
PowerPoint slides
2 electric skillets
Paring knife
2 spatulas
Disposable plates, 2 per participant
Paper towels
Marker to write plates
Disposable table cover
Ice chest
8-ounce cups, 1 per participant
Tooth picks
Pitcher
Paper or note cards
Pencils

Handouts to prepare:
Cheese handout
Soft Cheeses handout

Before the lesson:
Cut cheese to be sampled during the lesson.
No more than 30 minutes before class, if desired, prepare cheese sandwiches so they will be ready to grill.

Foods needed:
For grilled cheese: buy enough cheese slices from each type of cheese so that each participant can have 1/4 sandwich. Purchase American cheese and either low-fat or fat-free cheese slices.
Soft spread margarine
Whole wheat bread, 2 per participant

For cheese tasting: buy enough cheese so each participant can have a small taste (a 1/2-inch cube). Buy examples of cheese with different levels of moisture such as reduced fat cream cheese, fat free sharp cheddar, Swiss and Parmesan.
Water
Optional: apple slices or saltine crackers to cleanse palate between tastes.

Activities during the lesson:

#1 Cheese Sampling You need paper plates, different types of cheeses, knife, paper towels, and tooth picks
Cut each type of cheese into taste-size bites (1/2-inch cubes). Place samples on plates and label. Have participants taste each one, using toothpicks, taking a bite of apple or saltine between cheeses to clear their palate of the taste of the previous cheese. Discuss with participants the differences in texture and flavors, their likes and dislikes, the costs of each variety and how they would use it at home.

#2 Cooking with Cheese You need 2 types of sliced cheese, whole wheat bread, margarine, knife, spatulas, skillets, plates and paper towels.
Cook enough cheese sandwiches for each participant to receive 1/4 of each sandwich. When sandwiches are grilled, cut in 4 pieces. Draw a line down the center of a paper plate for each person, label "American" or "Natural." Place grilled cheese samples on the appropriate sides of the plate. After everyone has sampled both sandwiches lead a discussion on differences and preferences.

Adults Need Dairy Too!

Adults Need Dairy Too!

Cheese 101
Know the Facts

Fun facts about cheese

- Why is cheese orange?
- There are over 670 different kinds of cheese
- The United States is the top cheese producer
  - Wisconsin and California are the top producing states

Source: http://cheese.com

Today we'll talk about…

- What makes cheese nutritious
- Serving sizes
- Different types of cheeses
- Tips for fitting cheese into a healthy diet
  - Keeping cheese costs lower
  - Cooking with cheese
  - The correct way to store your cheese
  - When to throw away cheese

Deliciously nutritious

- Cheese is a concentrated source of many of milk's nutrients
  - 10 pounds (5 quarts) of milk makes 1 pound of cheese
- What important nutrients make cheese healthful?
- What are the health benefits of theses nutrients?

Source: http://www.dairyforall.com

cheese.com

Make cheese healthful

- How can we make cheese fit a healthy diet?
- Why is it important to do so?
- Can people who are lactose intolerant eat cheese?
  - What are their options?

Get the right amount

- How much cheese would be considered one serving size?
  - 3 dice are about equal to the correct serving size
- How many servings should you have a day?

Source: http://myfoodpyramid.org

Types of cheeses

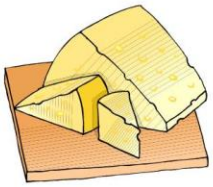
- Do you know the difference?
  - Hard cheese (sharp, medium, mild)
  - Semi-soft cheese
  - Soft cheese
  - Processed cheese
- How is variety created between cheeses?
- Name some hard and soft cheeses

Source: http://www.southwestdairyfarmers.com

Nutrient comparison per ounce

- Regular cheddar: 113 calories, 9.5g fat
- Natural low-fat cheddar: 49 calories, 2g fat
- Natural fatfree cheddar: 45 calories, 0g fat
- Processed cheese also comes in low-fat,fat-free

Source:
http://www.nal.usda.gov/fnic/foodcomp/search/



Suggestions for fitting cheese into healthy diets

- Pizza roll-up—roll flour tortilla with 1-2 slices of part skim mozzarella and dip into salsa or tomato sauce
- Cheesy popcorn—toss 1/4 cup low-fat shredded Colby or Cheddar with a cup of popped corn
- Sprinkle low-fat shredded cheese on soups, salads, and veggies

***Check the handout for more tips!

Source: http://3aday.org

Suggestions for fitting cheese into healthy diets

- Pizza roll-up—roll flour tortilla with 1-2 slices of part skim mozzarella and dip into salsa or tomato sauce
- Cheesy popcorn—toss 1/4 cup low-fat shredded Colby or Cheddar with a cup of popped corn
- Sprinkle low-fat shredded cheese on soups, salads, and veggies

***Check the handout for more tips!

Source: http://3aday.org

Buying cheese- choose wisely

- Once you pick a type of cheese, how do you pick the package to buy?
  - Is your choice based on convenience, price, brand, or something else?
- Check the unit price to find the most economical choice
  - You may save if you slice, cube, and/or shred cheese yourself
    - Tip: this is usually easier to do when the cheese is cold

Activity

Cooking with cheese

- Did you notice a difference the way the processed American and the low-fat natural cheese melt?
- Is there a difference between in taste? Which do you prefer?
- Do you think your family would like low-fat cheese?

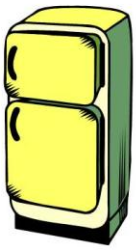
Storing cheese: the 3 C's

- **Clean:** Cheese absorbs flavors and needs to be protected from other foods
- **Cold:** Refrigerate between 34-38°F
- **Covered:** Unwrapped cheese loses flavor and moisture—original packaging is best OR
  - Hard: wrap tightly in plastic wrap
  - Soft or fresh: store in clean, airtight containers
  - Semi-hard: wrap in plastic wrap, waxed paper or parchment

Source: http://www.eatwisconsincheese.com

How long will cheese keep?

- Natural hard and processed cheeses
  - Unopened: 6 months
  - Opened, well wrapped: will keep 3-4 weeks in refrigerator
- Shredded hard cheeses and soft cheeses should be used within 2 weeks



Source: http://www.fightbac.org

Moldy cheese

- Throw out moldy fresh (cream or cottage cheese), soft, shredded, cubed or sliced cheeses
- If block hard cheese has a moldy surface, cut off 1/4 to 1/2 inch from the mold and use the remaining cheese in 1 week

Review

Today we talked about:

- The nutrients in cheese
- How much cheese is in a serving
- Different kinds of cheese
- Easy cheese snack ideas
- The best ways to make cheese cheap
- The way different cheeses cook
- The 3 C's for storing cheese
- How long to keep your cheese

Goals for the week—pick 1 or make up 1 of your own

- Try a new kind of cheese
- Switch to a lower-fat cheese
- Measure the right amount of cheese for a serving of dairy
- Buy a block of cheese and shred or slice it yourself
- Store cheese the safe way

Any questions or comments?

"Adult Need Dairy Too!" Is a joint project of the Cooperative Extension Services in Oklahoma, New Mexico and Texas and is partially funded by Southwest Dairy Farmers.

Lesson plan: Food Safety and Dairy

Materials and equipment needed:
Computer and projector
Extension cord if necessary
PowerPoint slides
8-ounce cups, 1 per participant
Paper or note cards
Pencils
Pitcher for water

Handouts to prepare:
Food Safety and Dairy handout

Before the lesson:
Choose a recipe from another lesson to prepare ahead as a snack during the lesson. Prepare a shopping list, buy groceries and make the snack before class begins. Remember to include any items that may be needed for serving such as plates or napkins.

Foods needed:
Water
Ice for ice chest

Activities during the lesson:

#1 Brainstorm:
Discuss each of the 4 "be food safe" steps. Ask participants for suggestions on ways they could or do, follow the steps to help make their dairy and other foods safety to eat.

Adults Need Dairy Too!

Adults Need Dairy Too!

Keep Dairy Safe
Know the Safety Rules

Wow

- Every year 76 million illnesses and about 5,000 deaths are linked to foodborne illness
  - How many of you have gotten sick from something you ate?
  - What type of symptoms did you have?
- Handling dairy foods safely reduces your risk of illness

Source: http://cdc.gov

Today we will talk about..

- 4 steps to fight foodborne illness
- Pasteurization
- Storing dairy foods
- Hot to tell milk is spoiled and needs to be thrown out
- Tips to get dairy foods home safely
- How to safely take dairy foods on the go

Discussion

Brain storming

- What can you do to make sure to follow all "Be Food Safe" steps?
  - Clean
  - Separate
  - Cook
  - Chill

Source: http://befoodsafe.org/

Importance of pasteurization

- A process that kills harmful bacteria by heating milk to a specific temperature for a set period of time
- Some believe raw milk is a safe alternative but it can contain dangers that can pose serious health risks
  - *Salmonella, e. coli, listeria*

Source: http://www.foodsafety.gov/keep/types/milk/index.html

Pasteurization myths and facts

- Raw milk DOES NOT kill dangerous pathogens by itself.
- Pasteurization DOES NOT cause lactose intolerance and allergic reactions.
- Pasteurization DOES NOT reduce milk's nutritional value.

Source: http://www.foodsafety.gov/keep/types/milk/index.html

Pasteurization myths and facts

- Pasteurization DOES NOT mean it is safe to leave milk out of the refrigerator for extended time, particularly after it has been opened.
- Pasteurization DOES kill harmful bacteria.
- Pasteurization DOES save lives.

Microbe multiplication

- Bacteria vary in how quickly they multiply
- In general it happens quicker at room temperature and when there are more in the food to begin with
- Treating dairy food well will extend their shelf life and save you money

Group activity

Double trouble: microbe math

- Start with 1 microbe in a food. Every 20 minutes each microbe becomes 2
- If your food sits out at room temperature 3 hours
  - 1 hour: 1 doubles to 2, 2 doubles to 4, 4 doubles to 16
  - 2 hours: 16 double to 32, 32 doubles to 64, 64 doubles to 128
  - 3 hours: 128 doubles to 256, 256 doubles to 512, 512 doubles to 1024 microbes!

Proper storage helps dairy foods last longer—saves money

- How cold dairy should your refrigerator be when dairy foods are stored?
- Where is the best place in your refrigerator to store dairy foods?
- The 2 hour rule

Source: http://www.fightbac.org

Tips for buying dairy foods

- Buy cartons with the furthest date
- Buy from a store with a high turnover
- Shop in the cooler parts of the day and when stores are less busy
- Pick up refrigerated/frozen foods last
- Go straight home with groceries and put them away

Keeping milk cold until you get home

- If the store has thick paper bags in the freezer section to help keep cold foods cold, use them
- Bring an ice chest to keep cold food cold
- Double bag cold foods
- Keep the cold food in the passenger part of the car with you
- Bag cold foods together

Tools & tricks: dairy on the go

- Carry milk in an insulated mug or tumbler
- If there is a refrigerator at work, store dairy foods there
- Freeze regular yogurt to keep it cold several hours
- Use an ice pack or ice chest
- Some dairy foods make great snack and don't need refrigeration

Is your milk still sweet?

- Dates on milk cartons are "sell by" dates
  - Milk may be good for a couple of days after the carton date
- Milk can spoil before the date on the carton
  - To check the quality of milk:
    - Look at the milk through the carton
    - Smell the milk in the carton
    - Pour some into a glass, smell milk in the glass
    - If uncertain, take a small sip (sour milk has an acid taste)

Review

Today we talked about:

- Keeping harmful microbes out of dairy foods
- Choosing pasteurized dairy foods
- How to take dairy foods directly home from the market and refrigerate them right away
- Safe dairy storage including the 2 hour rule
- Ideas to safely bring dairy on the go
- How to know when it is time to throw away milk

Goals for the week—pick 1 or make up 1 of your own

- Take home word search activity
- Follow the 4 steps of keeping food safe
- Make sure all dairy foods you have are pasteurized
- Check the time milk is left out of your refrigerator. Are you following the 2 hour rule?
- Go straight home from the grocery store
- Take a dairy snack on the go

Any questions or comments?

"Adult Need Dairy Too!" Is a joint project of the Cooperative Extension Services in Oklahoma, New Mexico and Texas and is partially funded by Southwest Dairy Farmers.

Lesson plan: Breakfast

Materials and equipment needed:
Computer and projector
Extension cord if necessary
PowerPoint slides
4-ounce size disposable cups to sample yogurt parfait
8-ounce drinking cups, 1 per participant
Tall, clear glass to make parfait
Disposable spoons, 1 per participant
Paper towels
Disposable table cover
Ice chest
Tray to hold prepared samples
Pitcher for water
Paper or note cards
Pencils

Handouts to prepare:
Breakfast handout
Yogurt handout
Breakfast barrier questionnaire

Before the lesson:
No more than 1 hour prior to lesson:
In 4oz cups, combine ingredients for yogurt parfait: layer yogurt, cereal, fruit, and top with yogurt (a spoonful of each)
Store on a tray in ice chest or refrigerator until needed

Foods needed:
Low-fat vanilla yogurt, 32 oz container yields 16 samples
Low-fat cereal, 1 box (ex Cheerios, Life)
Fresh or defrosted berries, enough for participants to have two or three
Water
Ice for ice chest

Activities during the lesson:

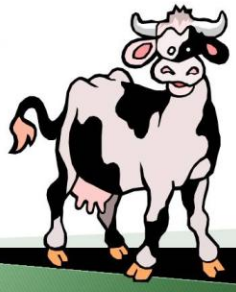
#1-Breakfast Barriers You will need the Breakfast Barriers handout. Have participants fill out the breakfast barriers questionnaire and discuss what their barriers are and how they may be able to overcome some of them.

#2-Time a Quick Easy Breakfast You will need yogurt, cereal, berries, clear glass, spoon
Demonstrate how to make the yogurt parfait recipe found on the Breakfast handout. Ask someone time how long it takes to make the recipe.
Provide pre-made samples and discuss taste. Would this be something families would make for a quick breakfast at home?

Adults Need Dairy Too!

Adults Need Dairy Too!

Delight in Dairy Daily
Breakfast



Discussion
Breakfast

- Eating breakfast every day is an important nutrition habit for good health
- Can you tell me some benefits of eating breakfast?
- How often do you have breakfast?
  - Always, most days, sometimes, never?
- What foods/beverages make up your usual breakfast?

Today we'll talk about…

- Benefits of eating breakfast
- Can dairy help you lose weight?
- Breaking breakfast barriers
- The importance of adding dairy to our breakfast

Breakfast advantages

- Those who eat breakfast:
  - Are calmer and less anxious
  - Have more energy
  - Have fewer morning headaches
  - May have faster memory recall
  - Are less likely to be overweight

Source: http://www.nationaldairycouncil.org

Can eating breakfast help with weight loss?

- Eating in the morning helps kick start your metabolism
- Your metabolism partly determines how fast you burn calories throughout the day

Source: http://www.mealsmatter.org

Can dairy help with weight loss?

- Study showed no difference in weight gain for teen girls on a high-calcium diet vs. a normal diet
- 24-week study of obese adults found those who ate a reduced-calorie diet with 3-4 servings of dairy foods lost a greater % body weight than those taking calcium supplements & those in on low-dairy or low-calcium diets

Source: Bhatia, J. (2007) Debunking Dairy Food Myths, Nutrition Fact Sheet, American Dietetic Assoc., http:www.eatright.org

Discussion

Do you have breakfast barriers?

- Afraid you'll gain weight if you eat breakfast?
- Not hungry in the morning?
- The foods you like are not available, take too long to fix or are high fat?
- Too short on time to make something to eat?
- Lactose intolerant?
- Others?

Nutritious breakfast

- Just as important as eating breakfast
- Remember MyPyramid—try to eat foods from at least 3 bands
- Dairy foods (blue band) are one of the easiest and best to add nutrition to your breakfast

Source: http://www.mypyramid.gov

Adding dairy to breakfast

- Add low-fat milk to everything:
  - Coffee, cereal, oatmeal, breakfast smoothie with your choice of fruit, in a glass on the side
- Sprinkle low-fat cheese on eggs or omelets
- Top pancakes with yogurt and fruit
- Melt low-fat Swiss cheese over lean ham on a bagel, toasted English muffin or toast
- Yogurt, a bagel/toast, and an apple are good on-the-go breakfast items

3aday.org

Activity

Making quick breakfasts

- Timed-quick easy breakfast meals:
  - Creamy banana oatmeal
  - Breakfast yogurt
    - Both recipes included on handout

Review

Today we talked about:

- Why breakfast is important
- How eating breakfast helps with weight loss
- How to overcome breakfast barriers
- Why we should have dairy for breakfast and how to do it

Goals for the week—pick 1 or make up 1 of your own

- If you don't always have breakfast, have it at least one time more than an average week
- Choose a breakfast with foods from at least 3 MyPyramid bands
- Overcome one breakfast barrier

Any questions or comments?

"Adult Need Dairy Too!" Is a joint project of the Cooperative Extension Services in Oklahoma, New Mexico and Texas and is partially funded by Southwest Dairy Farmers.

Lesson plan: Dairy snacks and Beverages

Materials and equipment needed:
Computer and projector
Extension cord if necessary
PowerPoint slides
4-ounce disposable cups for milk sickles
4-ounce, 8-ounce, 12-ounce, 16-ounce disposable cups for comparison activity
8-ounce disposable cups, 1 per participant
Disposable spoons, 1 per participant
Paper towels
Disposable table cover
Ice chest
Tray to hold prepared samples
Paper or note cards
Pencils
Pitcher for water

Handouts to prepare:
Snack handout
Beverages handout

Before the lesson:
No less than four hours prior to lesson, make milk sickles by combining milk and strawberry flavoring. Pour in 4-ounce disposable cups Insert a disposable spoon in each cup. Set filled cups on a tray and place in freezer. When frozen solid cups can be transferred to a freezer bag. For class, move to an ice chest or leave in freezer until needed. Use as snack example - give anytime during lesson.

Foods needed:
Low-fat milk, 4 ounces per participant
Strawberry milk flavoring powder, one container
Water
Ice for ice chest

Activities during the lesson:

#1-Brainstorm:
Discuss ideas for adding healthy dairy snack to your diet. The educator may act as recorder to write down the ideas or ask a participant to do that for the group.

#2-Portion Size:
Line up a 4-, 8-, 12– and 16-ounce cup. Discuss how many ounces are in each cup, and then discuss what the proper portion size is for a serving of dairy. The 8-ounce cup is one serving of dairy. Adults should have 3 servings of dairy daily. It does not all need to come from beverages. Other dairy foods can also provide part of the daily dairy needs.

Adults Need Dairy Too!

Adults Need Dairy Too!

Dairy all Day
Snacks and Drinks

Today we'll talk about…

- Snacking habits
- Benefits of snacking
- Ideas for dairy snacks
- What we are drinking
- The nutrient differences between milk and other beverages
- Beverage portion sizes
- Ideas for dairy beverages

Discussion

Is snacking ok?

- How many of you snack between meals?
  - What types of snacks do you have?
- How many snacks should you have a day?

Snack facts

- Snacking can help you control overeating by not letting you feel "hungry"
- Calories from healthy dairy snacks can help manage weight by keeping metabolism active throughout the day

Source: http://www.mayoclinic.com

Fitting in snacks—calories count!

- On a 2000 calorie diet:
  - With 3 meals and 3 snacks:
    - Divide 2000 by 4 = 500 calories
    - Divide 500 by 3 = about 170 calories
    - Meals should be around 500 calories each
    - Snacks should be around 170 calories each

Smart dairy snack ideas

- Mix crushed pecans into low-fat vanilla yogurt
- Wrap a fatfree pretzel in reduced-fat string cheese
- Freeze 1 cup low-fat orange or strawberry flavored milk in a popsicle container
- Mix yogurt with fresh fruit or granola

Activity

Brainstorming

- **Let's think of other healthful dairy snacks to try…**

What are we drinking?

- **By age 5 we drink more carbonated soft drink than 100% fruit juice**
- **By age 13, teens drink more carbonated soft drinks than 100% fruit juice, milk, or fruit drinks and ades**

Source: Rampersaud, G.C., Bailey, L.B. and Kauwell, G.P. National survey beverage consumption data for children and adolescents indicate the need to encourage a shift toward more nutritive beverages. J Am Diet Assoc. 2003 Jan;103(1):97-100.

Think your Drink

Lowfat milk 1%	Orange Juice	Soda
• Calories-100	• Calories-110	• Calories-150
• Vitamin D-25%	• Vitamin D-0%	• Vitamin D-0%
• Calcium-30%	• Calcium-2%	• Calcium-0%
• Total fat-4%	• Total fat-0%	• Total fat-0%
• Total carbs-4%	• Total carbs-8%	• Total carbs-14%
• Protein-16%	• Protein-0%	• Protein-0%
• Vitamin A-10%	• Vitamin A-2%	• Vitamin A-0%
• Vitamin C-2%	• Vitamin C-150%	• Vitamin C-0%

Source: http://www.nationaldairycouncil.org

Ideas to help you drink more milk

- Add low-fat milk to your coffee
- Mix hot chocolate packets with milk instead of water
- Make a smoothie with fresh fruit, fat free frozen yogurt, and milk
- Lactose intolerant? Most groceries carry lactose-free milk
- Find more tips on the dairy beverage handout!

Activity

Portion sizes

- Too much of any food or drink can be a bad thing
  - Portion sizes are important
  - 1 portion of milk = 8 ounces
- Look at several different sized cups and estimate how many ounces they contain
- Which cup size is the right portion for one serving of dairy?

Review

Today we talked about:

- How snacking adds to a healthy diet
- How to spread calories throughout the day
- Dairy snacks ideas
- What we are drinking
- Nutrient difference between beverages
- Dairy beverages ideas
- Beverage portion sizes

Goals for the week—pick 1 or make up 1 of your own

- Count calories for a couple of days to see where you stand
- Use some of the recipes from the dairy snack and dairy beverage handouts
- If you drink more soda than you should, drink 1 less soda each day

Any questions or comments?

"Adult Need Dairy Too!" Is a joint project of the Cooperative Extension Services in Oklahoma, New Mexico and Texas and is partially funded by Southwest Dairy Farmers.

Lesson plan: Milk

Materials and equipment needed:
Computer and projector
Extension cord if necessary
PowerPoint slides
4-ounce disposable cups for pudding, 2 per participant
8-ounce cups, 1 per participant
Disposable spoons, 1 per participant
Paper towels
Disposable table cover
Ice chest
2 trays or empty cake pans to hold pudding samples
Hand mixer to prepare pudding
Medium bowls, 2
Liquid measuring cup, 1
Pitcher
Paper or note cards
Pencils

Handouts to prepare:
Milk handout

Before the lesson:
No less than 3 hours prior to lesson, mix and chill pudding 2 versions of pudding to be sampled, one using whole milk and one with low-fat milk. Make enough of each type of pudding for each participant to receive a 2 tablespoon sample. Label half of the 4-ounce disposable cups A, the other half B. Divide the puddings into the cups, making sure you know which type of pudding is in the A and B cups. Store samples on a tray or in a cake pan in ice chest or refrigerator until needed.

Foods needed:
Whole milk, 2 cups per pudding box
Low-fat milk, 2 cups per pudding box
Instant vanilla pudding, at least 2 boxes(2 tablespoon prepared sample each)
Ice for ice chest
Water

Activities during the lesson:

#1 Pudding Sampling You need spoons and prepared pudding tasting cups labeled A and B (be sure you know what kind of milk is used in each).
Have participants try each sample. Have water available to sip between tasting of different pudding samples.
Discuss the differences between the samples, which they prefer and whether or not this is something they might try at home.

Adults Need Dairy Too!

Adults Need Dairy Too!

Milk
Make it Easy

Today we'll talk about…

- Why adults still need dairy foods
- The amount of milk adults need daily and how to get it
- The difference between low-fat and whole milk
- Lactose intolerance

Why drink milk when you're all grown up?

- Diets rich in milk/milk products help build and maintain bone mass throughout life which may reduce the risk of osteoporosis.
- Diets that include milk products tend to have higher overall nutritional quality.

More than healthy bones

- Did you know calcium is also…
  - Needed for blood to clot
  - Used in the transmission of nerve impulses
  - Used to regulate of your heart's rhythm

nationaldairycouncil.org

Discussion

Amount of milk grown-ups need

- 3 servings of dairy foods
  - 1 cup (8 ounces) milk is 1 serving recommended each day
- What other foods or drinks could you find that come in an 8 ounce size?

Source: http://www.mypyramid.gov/

Ways to get 3 a day

- Make a smoothie
- Add milk to your coffee
- Add milk to cold or hot cereal
- Make soups with milk
- Drink milk instead of soda or juice drinks
- Make pudding made with milk or drink a glass of chocolate milk mixed with crushed cookies

Source: http://www.nationaldairycouncil.org/

Low-fat vs. whole milk

- Low-fat: same amount of calcium, protein, other minerals & vitamins as whole, but lower amounts of fat & calories
- Whole: more fat, saturated fat, calories
- What to do if you don't like reduced fat milk
  - Gradually move down, mixing if needed

Activity

Comparing puddings

- Try the same pudding recipe made with whole milk and low-fat milk
  - Can you taste the difference?
  - Would you switch to low-fat milk for recipes similar to this one?

Lactose intolerance defined

- Occurs more often in people of color
- Failure to produce enough lactase (an enzyme) to digest the lactose (sugar) in milk
  - Undigested lactose is fermented by bacteria found in the intestine
- Symptoms may include nausea, cramping, bloating, pain, intestinal gas, diarrhea
- Symptoms may appear 15 minutes to several hours after eating lactose-containing foods and beverages

Eating dairy foods when lactose intolerant

- Choose lactose-free milk
- Take a lactase pill or drops before eating or drinking milk products
- Many with problems digesting lactose can eat or drink:
  - Up to 1 cup milk with a meal
  - Yogurt or cheese
  - Milk on hot or cold cereal
- Remember, choose low-fat or fat-free milk, yogurt, cheese

Source: http://www.mypyramid.gov/mypyramidmoms/health_needs.html

Review

Today we talked about:

- Why adults still need dairy foods
- How much milk adults need daily
- What is a serving of milk
- The importance of to switching to low-fat milk
- Lactose intolerance and how those who are lactose intolerant may be able to eat/drink dairy foods

Goals for the week—pick 1 or make up 1 of your own

- Switch to a lower fat milk
- Measure the amount of milk you usually drink to find out if it an 8 oz serving

Any questions or comments?

"Adult Need Dairy Tool" Is a joint project of the Cooperative Extension Services in Oklahoma, New Mexico and Texas and is partially funded by Southwest Dairy Farmers.

Adults Need Dairy Too!

Add Dairy Daily

Tips to help you out!

Breakfast

- **Pancake dilla**—make a pancake quesadilla by putting 1 cup fruit yogurt between two pancakes.
- **Pizza for breakfast**—melt 1 slice low-fat Swiss cheese over lean ham on a toasted English muffin.
- **Fruit smoothie**—blend any cup fruit with a cup low-fat milk or yogurt and a cup ice.
- **Wonderful waffles**—put strawberry yogurt and berries on top of whole-wheat waffles.
- **Milk steamer**—heat up a cup of low-fat milk with any flavoring and add cinnamon.
- **Cheesy omelet**—melt low-fat cheddar or provolone cheese over an egg white omelet.
- **Creamy cereal**—add your favorite cereal to a cup of low-fat yogurt for a creamy on-the-go breakfast

Lunch

- **Saucy burger**—combine 1 cup yogurt with 1/4 cup low-fat shredded cheddar cheese with taco seasoning and top off an extra lean burger.
- **Tremendous tuna sandwich**—melt 1 slice low-fat American cheese over an open-faced tuna sandwich.
- **Creamy chicken noodle**—add low-fat milk to your chicken noodle soup instead of water.
- **Roll-up**—roll 1-2 slices part-skim mozzarella cheese in a tortilla and dip in tomato sauce
- **Chicken dip**—mix yogurt with ranch dressing mix for a yummy dip for your breaded chicken tenders
- **Loaded potato**—heat a can of low-fat chili to top a baked potato, add a dollop of low-fat plain yogurt.
- **Creamy fruit salad**—add low-fat yogurt to your fruit salad mixture.

Adults Need Dairy Too!

Dairy for Breakfast

3-minute Breakfast

Creamy Banana Nut Oatmeal

Ingredients:

- 1 cup fat free skim or 1% low-fat milk
- 2 packets instant oatmeal
- 1/2 ripe banana, mashed
- 1/2 tablespoon chopped pecans or walnuts

Directions:

In a small bowl, combine milk and packets of oatmeal; Microwave on high for 1 to 2 minutes until steaming hot, but not boiling. Stir until creamy. Stir in mashed banana. Sprinkle with nuts. Serve.

Nutritional Facts per serving:

Calories: 370
Fat: 2.5 g
Saturated Fat: 0g
Cholesterol: l5 mg
Sodium1: 10 mg
Carbs: 61 g
Protein: 17 g
Calcium: 25% Daily Value

Why is dairy important?

- Dairy products provide very important nutrients such as: calcium, vitamin D, niacin, vitamin B12, potassium, magnesium, and vitamin A, which many adults miss in their daily diets.
- Studies show that adding dairy foods to your diet not only promotes healthy bones, but also might help reduce high blood pressure and some cancers along with helping to maintain a healthy weight.
- The daily recommendation of dairy for adults is 3 servings a day.
- Do your health a favor and have some dairy for breakfast!

Tips to add dairy to your mornings

- Add low-fat milk to a bowl of cold or hot cereal
- Add low-fat milk to your coffee
- Sprinkle low-fat cheese over your eggs.
- Have some yogurt with granola and some fruit.
- Blend fresh oranges with strawberry yogurt and ice.
- Have a cheese omelet.

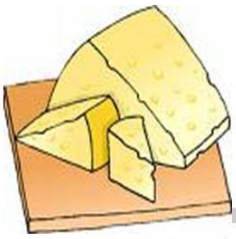
My Breakfast Barriers

Breakfast benefits that are most important to me:

My Breakfast barriers are:

Things I can do to overcome my barriers:

Adults Need Dairy Too!



Adults Need Dairy Too!

Cheese

Money Saving Tip

Buy cheese by the block and shred or cut into individual portions yourself instead of buying it precut.

Graters:

- Graters come in several different varieties such as squared, one-sided, and flat.
- Squared, stand-up graters are the safest to use because they are more stable.
- Make sure to always leave half an inch of cheese between the grates and your fingers to keep from getting cut.

How Much Cheese to Eat

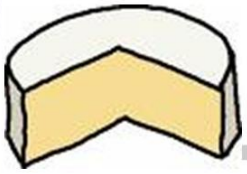
- Men and women 19 and older should get 3 servings of dairy foods each day. Cheese can be eaten for one of those dairy food servings.
- Any of the following will count as 1 serving of dairy foods:
  - 1-1/2 ounces natural cheese
  - 1/3 cup shredded cheese
  - 2 ounces processed cheese
- A serving of cubed cheese looks about the size of 3 dice.

Make Cheese Healthy

- Try low-fat or fat-free products.
- Aged cheeses such as cheddar or Swiss are low in lactose and may be okay for those who are lactose-intolerant.

Easy Ways to Add Cheese

- Make a Salsa Roll-up—roll a stick of string cheese in a small whole wheat tortilla and dip in salsa.
- Sprinkle low-fat grated cheese on soups, salads, and cooked vegetables.
- To make a Chicken Melt—melt reduced-fat Colby Jack cheese over 2 ounces of cooked or canned chicken on a toasted English muffin.
- Top wheat crackers with low-fat mozzarella cheese and cherry tomatoes that have been cut in half.



Adults Need Dairy Too!

Soft & Semi-Soft Cheeses

Soft Cheeses

Soft cheese is eaten within a month or two of being made. Because of its higher moisture content it spoils more quickly than harder, aged cheeses.

There are three categories of soft cheeses.

1. Fresh—feta, cottage and ricotta
2. Soft—cream cheese and Brie
3. Semi-soft—fontina and munster

Whichever cheese you choose, make sure it is made with pasteurized milk.

Fresh, Soft and Semi-soft vs. Hard Cheeses

The main difference in the level of softness depends on the moisture content:

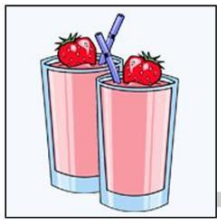
- Hard cheese has less than 50% moisture content.
- Semi-soft cheese has between 50%-75% moisture content.
- Soft cheese has very high levels of moisture above 75%.

Cheese varieties are different because of the type of milk used and the techniques used during production:

- Different strains of bacteria or molds are used.
- The length of aging varies.
- Milk from different animals with different fat contents and flavors are used.
- Flavoring agents such as herbs, spices, and wood smoke can make a difference as well.

Nutrition

- Look for and try low-fat or non-fat soft and fresh cheeses.
- Cheeses made with cow's milk usually have less fat than those made with goat's milk.
- Although fresh and soft cheeses are usually not the best food choice for those who are lactose intolerant, pills made to help break down lactose can be taken prior to eating a soft cheese.



Adults Need Dairy Too!

Dairy Beverages

Take Dairy Beverages on the go

- An insulated container would be a good way to make milk or dairy beverages last longer.
- Drinkable yogurts are a good dairy choice to take for later use. When frozen, drinkable yogurt will last a few hours and be thawed when you are ready for a drink.
- Store an ice pack with cold dairy foods when you'll be away from refrigeration for several hours.

Facts

- Milk provides protein to support muscle growth and maintenance.
- There was 20.8 gallons of milk available to each American in 2008. During that same year we averaged 760 eight-ounce servings of carbonated beverages each (that equals 47.5 gallons).
- A 12 ounce soda contains 30-40 grams of sugar or more, about 140 calories, but very few important nutrients needed by both adults and children.
- Milk contains vitamins and minerals commonly missing from adult diets such as vitamin A, vitamin D, vitamin B12, riboflavin, niacin calcium, potassium and phosphorus.

Quick, easy ways to add dairy to your beverages

1. Add low-fat milk to your coffee.
2. Make milk steamers by heating up milk , then adding honey or cinnamon for a warm treat.
3. Drink flavored low-fat milk when you feel the need to reach for something sweet such as a soda.
4. If lactose intolerant, try finding a lactose-free milk instead of leaving milk out of your diet completely.

Adults Need Dairy Too!

Dairy Snacks

How much should you eat?

The Dietary Guidelines recommend 3 servings of dairy foods per day.

Estimating serving size:

1/2 cup frozen yogurt
A light bulb

1 cup yogurt
A baseball

3 ounces of cheese
3 dice

1 slice of cheese
A computer floppy disk

Is snacking ok?

- Snacking helps control eating associated with going too long between meals. Plus, these mini meals provide up to one-fourth of a person's daily energy needs, helping fill important nutrient gaps. Be sure to keep healthful, nutrient-rich, quick snacks, like string cheese and yogurt, on hand.

Why have dairy foods for a snack?

- Dairy foods promote prevention of diseases such as osteoporosis and helps maintain a healthy blood pressure.
- Low-fat dairy products have been shown to promote weight loss especially in the mid section.

Do the Math

- Milk, yogurt, and cheese, combined, provide 7 important nutrients in your diet. Americans tend to miss out daily on four of those-– calcium, potassium, magnesium, and vitamin A.
- 3 cups of low-fat milk provides a large portion of the amount of these nutrients adults need every day (Daily Value or DV) plus other nutrients.

92% DV	**Calcium**
33% DV	**Potassium**
74% DV	**Phosphorus**
48% DV	**Protein**
30% DV	**Vitamin A**
75% DV	**Vitamin D**
20% DV	**Magnesium**

Adults Need Dairy Too!

Food Safety & Storage

Handle Food Safely

- Make sure to always wash your hands before and after handling food.
- Keep all food exposed surfaces clean.
- Keep raw meats away from other foods.
- Avoid cross contamination by using different utensils for each food item when cooking.
- Cook foods to the proper temperature.

General Dairy Safety

- Refrigerator should be kept at a temperature below 40 °F and freezer should be kept at a temperature below 0 °F
- The expiration date is usually just a suggestion from the manufacturer for the grocery store's benefit.
- Always check expiration date, if expired use smell, sight or a small taste to decide whether or not the product has gone bad.

Tips for Cheese Storage

- If hard cheese is moldy, it is still okay as long as the mold is cut at least an inch from the area. With soft cheeses most are made from mold. Make sure the mold is part of the manufacturing process for the particular cheese in question.
- Make sure to always keep cheese refrigerated to prevent the growth of unwanted molds. For the most part, hard cheeses last longer than soft cheeses.
- Although freezing might change the flavor or texture of soft cheeses, they will last around 6 months in the freezer. When thawed, cheeses are best for crumbling over soups or salads.

Adults Need Dairy Too!

Milk

Serving Size Facts

- Dietary guidelines recommend 3 servings of dairy a day which is equal to 3 cups of milk.
- One serving or one cup of milk costs about 25 cents.
- 3 cups of broccoli have the same amount of calcium as 1 cup of milk.

Sweet Treats!

- Drink low-fat chocolate or strawberry milk!
- Strawberry sicles—mix low-fat strawberry milk with fresh strawberry slices and freeze in popsicle container or small paper cups.

What are the Health Benefits of

- Milk provides nine essential nutrients such as calcium, potassium, phosphorus, protein, vitamin A, vitamin D, vitamin B12, riboflavin, niacin.
- Vitamin D helps the body absorb and use calcium.
- Potassium has been shown to help maintain a healthy blood pressure.
- Milk protein supports muscle growth and maintenance.

Why Drink Low-Fat Milk?

- The 2005 Dietary Guidelines for Americans recognize that people who consume more low-fat and fat-free dairy foods have better overall diets, have more nutrient intake and improved bone health.
- Low-fat milk has the same amount of calcium, protein, other minerals, and vitamins as whole milk but has lower amounts of fat and calories.
- Drink whole milk? Gradually lessen the fat content by switching to 2% then 1% and finally to skim milk.

Adults Need Dairy Too!

Dry Milk

Mixing Dry Milk

- Combine powder and water in a jar with a lid or in a pitcher.
- 1/3 cup dry milk + 1 cup water = 1 cup nonfat milk
- 1 1/3 cup dry milk + 3 3/4 water = 1 quart nonfat milk

Tips for better taste:

- Refrigerate before drinking for better taste.
- Stir in a little sugar or vanilla.

What is Nonfat Dry Milk?

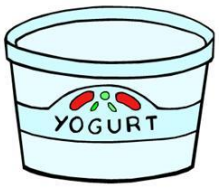
- Nonfat dry milk (or NFDM) is pasteurized fat free milk that has had the water removed.
- Instant NFDM has been processed so the particles clump together resulting in a product that is easier to mix with water.
- Once it has been mixed with water use the reconstituted NFDM like regular fluid milk.

Is NFDM as Nutritious as Fluid

- Nonfat dry milk is an excellent source of calcium.
- NFDM as all the same nutrients as fluid milk such as vitamin D, vitamin A, B-vitamins, and protein.
- Many mix reconstituted NFDM with an equal amount of fresh milk for drinking for better flavor and to save money.

Why use Nonfat Dry Milk?

- It taste almost the same as fluid milk if you make it up ahead and chill it well and has the same about of nutrients, but NFDM lasts much longer than purchased fluid milk.
- Store NFDM powder in a cool place. When stored at 70°F, NFDM in unopened containers will be good for up to 2 years. At 90°F the unopened milk will be good for only 3 months.
- Many grocery stores sell dry milk in individual pouches so you only have to open what you need.
- If NFDM develops an off-flavor during storage, use it in baked products.



Adults Need Dairy Too!

Yogurt

How much should you eat?

- One 8 ounce serving counts for one of the 3 dairy servings recommended for adults

Why eat yogurt?

- Eight ounces of low-fat plain yogurt contains around 12g of protein and about 45% of the daily value for calcium.
- Some yogurts contain probiotics which are live microorganisms that work in the intestine to restore the balance of helpful bacteria and raise resistance to harmful microorganisms.
- Eight ounces of yogurt has about the same amount of potassium as a banana.

Lactose Intolerant?

- People who are lactose intolerant may be able to eat yogurt.
- Yogurts that contain active cultures help to digest lactose.

Easy ways to add yogurt to your diet

- Mix crushed pecans into low-fat or fat-free vanilla yogurt for a quick high protein snack.
- Make Honey Fruit Dip by adding a spoon of honey to 6 ounces of fat-free yogurt and mix. Serve with fresh fruit.
- Use non-fat yogurt instead of sour cream and butter.
- Freeze whipped yogurt to make a frozen treat while also extending its shelf life.
- Mix yogurt with fresh fruit or granola for a tasty snack.

Oklahoma State University Institutional Review Board

Request for Determination of Non-Human Subject or Non-Research

Federal regulations and OSU policy require IRB review of all research involving human subjects. Some categories of research are difficult to discern as to whether they qualify as human subject research. Therefore, the IRB has established policies and procedures to assist in this determination.

REC'D URC

SEP 2 1 2010

1. Principal Investigator Information

First Name: Shonda	Middle Initial: M	Last Name: Speck
Department/Division: NSCI		College: HES
Campus Address:		Zip+4:
Campus Phone:	Fax:	Email: Shonda.speck@okstate.edu
Complete if PI does not have campus address:		
Address: 1029 Franklin Ave.		City: Stillwater
State: OK	Zip: 74075	Phone: 505-417-0871

2. Faculty Advisor (complete if PI is a student, resident, or fellow) ☐ **NA**

Faculty Advisor's name: Barbara Brown		Title: Assoc. Prof., Food Specialist
Department/Division: NSCI		College: HES
Campus Address: 002 HES		Zip+4: 74078
Campus Phone: 405-744-6940	Fax: 405-744-1357	Email: barbara.brown@okstate.edu

3. Study Information:

A. Title
Evaluation of the Effectiveness of the "Adults Need Dairy Too" Program

B. Give a brief summary of the project. (See instructions for guidance)
This project is part of the Community Nutrition Education Program (CNEP) at OSU that serves low income Oklahomans by providing food and nutrition training. CNEP is not required to submit an IRB as part of its education process. This project will focus on a comparison between dairy food consumption and attitudes of existing CNEP participants and changes in consumption and attitudes toward dairy foods when information is presented separately through additional dairy food education sessions. The evaluation will include pre and posttests, which are currently in use with participants, and 24-hour diet recalls. Data to be used will be extracted from the current evaluation process. The hypothesis is that with the implementation of the separate dairy food education sessions, dairy food consumption will increase in the low income population of Oklahoma.

C. Describe the subject population/type of data/specimens to be studied. (See instructions for guidance)
Researchers will have no access to the population being evaluated in this project. The data gathered will be collected as part of the usual evaluation process used by CNEP. Data received by researchers will have none of the 18 identifiers and will be group data. There will not be results of any individuals.

Oklahoma State University Institutional Review Board

Request for Determination of Non-Human Subject or Non-Research

4. **Determination of "Research".**
45 CFR 46.102(d): *Research* means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge. Activities which meet this definition constitute research for purposes of this policy whether or not they are conducted or supported under a program which is considered research for other purposes.

One of the following must be "no" to qualify as "non-research":

A. Will the data/specimen(s) be obtained in a systematic manner?
☐ No xYes

B. Will the intent of the data/specimen collection be for the purpose of contributing to generalizable knowledge (the results (or conclusions) of the activity are intended to be extended beyond a single individual or an internal program, e.g., publications or presentations)?
x No ☐ Yes

5. **Determination of "Human Subject".**
45 CFR 46.102(f): *Human subject* means a living individual about whom an investigator (whether professional or student) conducting research obtains: (1) data through intervention or interaction with the individual or (2) identifiable private information. Intervention includes both physical procedures by which data are gathered (for example venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes. Interaction includes communication or interpersonal contact between investigator and subject. Private information includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public (for example, a medical record). Private information must be individually identifiable (i.e., the identity of the subject is or may be ascertained by the investigator or associated with the information) in order for obtaining the information to constitute research involving human subjects.

A. Does the research involve obtaining information about living individuals?
☐ No x Yes
If no, then research does not involve human subjects, no other information is required.
If yes, proceed to the following questions.

All of the following must be "no" to qualify as "non-human subject":

B. Does the study involve intervention or interaction with a "human subject"?
x No ☐ Yes

C. Does the study involve access to identifiable private information?
x No ☐ Yes

D. Are data/specimens received by the Investigator with identifiable private information?
x No ☐ Yes

E. Are the data/specimen(s) coded such that a link exists that could allow the data/specimen(s) to be re-identified?
x No ☐ Yes
If "*Yes*," is there a written agreement that prohibits the PI and his/her staff access to the link?
☐ No ☐ Yes

Oklahoma State University Institutional Review Board

Request for Determination of Non-Human Subject or Non-Research

6. **Signatures**

Signature of PI Rhonda Speck **Date** 9-20-10

Signature of Faculty Advisor (If PI is a student) Barbara J Brown **Date** 9/20/10

☒ Based on the information provided, the OSU-Stillwater IRB has determined that this project **does not** qualify as human subject research as defined in 45 CFR 46.102(d) and (f) and **is not subject to oversight by the OSU IRB.**

☐ Based on the information provided, the OSU-Stillwater IRB has determined that this research **does** qualify as human subject research and **submission of an application for review by the IRB is required.**

Shelia M. Kennison
Dr. Shelia Kennison, IRB Chair

9/21/10
Date

VITA

Shonda Marie Speck

Candidate for the Degree of

Master of Science

Thesis: EVALUATION OF THE EFFECTIVENESS OF THE "ADULTS NEEDS DAIRY TOO" PROGRAM

Major Field: Nutritional Sciences

Biographical:

Personal Data: Born in Carlsbad, New Mexico on January 21, 1986

Education: Received a Bachelor of Science degree in Family and Consumer Sciences-Human Nutrition and Food Science at New Mexico State University in December 2008.

Experience: Graduate Assistant, working with Dr. Brown to develop handouts and lessons for the ANDT program, 2009-2010. Nutrition Technician at Stillwater Medical Center, 2010-present

Professional Memberships: American Dietetic Association

Name: Shonda Marie Speck Date of Degree: May, 2011

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: EVALUATION OF THE EFFECTIVENESS OF THE "ADULTS NEEDS DAIRY TOO" PROGRAM

Pages in Study: 99 Candidate for the Degree of Master of Science

Major Field: Nutritional Sciences

Scope and Method of Study: a Community Nutrition Education Program, "Adults Need Dairy Too", was evaluated, as an additional curriculum to the current CNEP curriculum, for its effectiveness on low-income CNEP participants' consumption of low fat/nonfat dairy products. The sample included 41 participants in the control group and 80 participants in the treatment group from various locations in Oklahoma. Data included 24-hour food recalls which were taken at pre and post treatment. From the recalls, one-milk equivalent servings were counted according to serving sizes listed on mypyramid.org. The curriculum was administered to the treatment group who were graduates of the current CNEP classes. The curriculum included six lessons, which focused on the importance of dairy, with tips, dairy snacks, and recipes to help incorporate low fat/nonfat dairy product consumption on a daily basis. The control group consisted of graduates of the current CNEP classes that were not taught the additional dairy curriculum.

Findings and Conclusions: Frequency of CNEP participants' one-milk equivalent serving consumption between the treatment and control group at pre and post administration of additional dairy curriculum was analyzed using a paired T test. The frequency of changes in the participants' one-milk equivalent serving consumption from pre to post between treatment and control groups were also analyzed using a paired T test. No significant changes were noted in the frequency of CNEP participants' one-milk equivalent serving consumption between the treatment and control group at pre and post administration of additional dairy curriculum or in the frequency of changes in the participants' one-milk equivalent serving consumption from pre to post between treatment and control groups.

ADVISER'S APPROVAL: _____